ROHDE&SCHWARZ

DOCUMENTATION

DOCUMENTATION

DOCUMENTATION

DOCUMENTATION

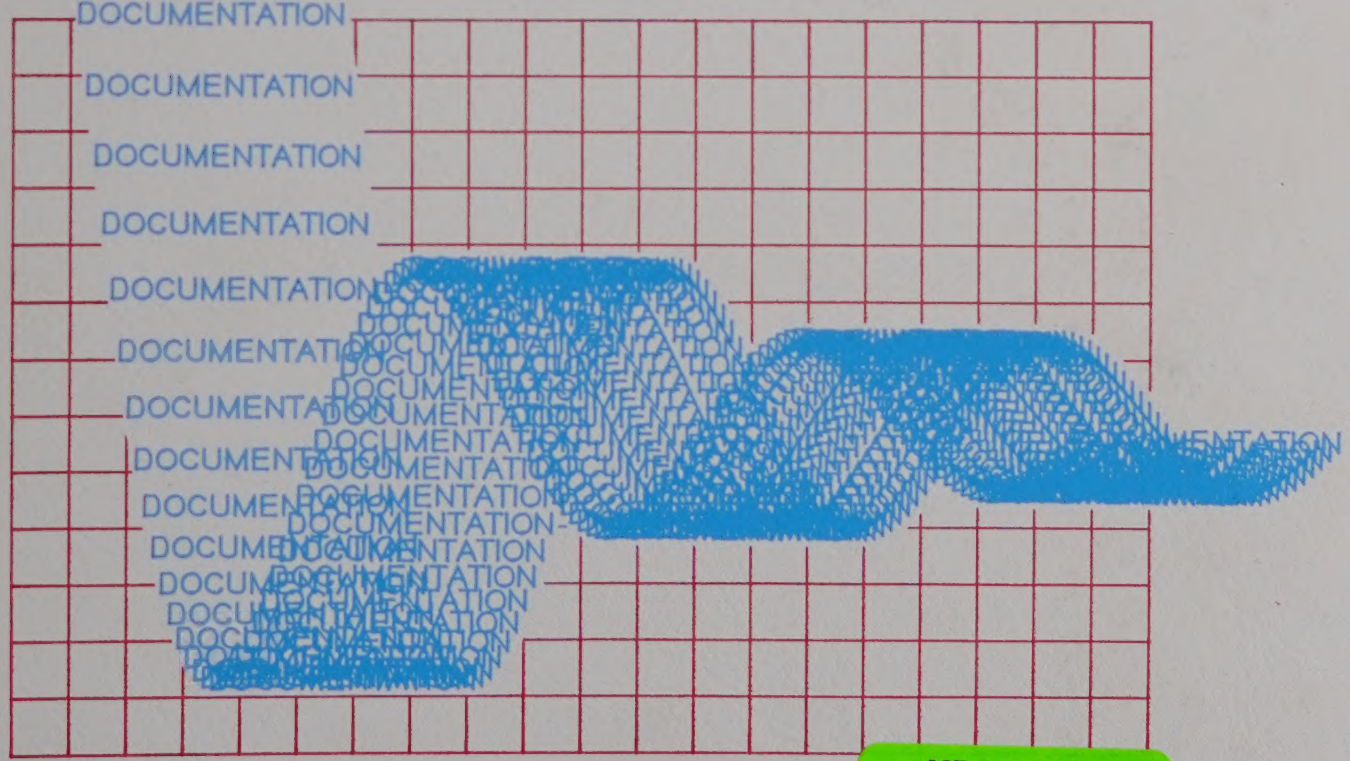
DOCUMENTATION

DOCUMENTATION

DOCUMENTATION

DOCUMENTATION

DOCUMENTATION



MP MASTER
MA20677

ROHDE&SCHWARZ

Test and Measurement
Division

Software Manual

Software for Phase Noise Measurement

for ESI, FSIQ, FSE (with option FSE-B15), FSP or external PC with WINDOWS

FS-K4

1108.0088.02

Version 1.3

Printed in the Federal
Republic of Germany

Contents at a Glance

Installation Instructions ..... (p9)

Instructions on hardware setup, installing and deinstalling FS-K4 on various operating systems.

How to Use FS-K4 ..... (p23)

A step-by-step guide to managing setup files, making measurements, and generating reports.

Menu Commands ..... (p31)

A full description of each menu command and dialogue box.

Parts of the FS-K4 Screen ..... (p53)

Introduces the different parts of the display.

Keyboard and Mouse ..... (p59)

Techniques for controlling the software

Command Line Options ..... (p63)

Various switches you can use to modify the way FS-K4 starts up.

Communication Problems ..... (p65)

What to do if FS-K4 cannot control your test receiver.

Data Storage Format ..... (p67)

Describes the content and syntax of the various types of file used by FS-K4.

Decision and Error Messages ..... (p77)

Lists all the messages that can be displayed when an operator decision is required, or when an error occurs.

Contents

1 Installation Instructions 9

Hardware Setup 9
Spectrum Analyzer 9
PC Compatible 9

Software Setup 10
Spectrum Analyzer, FSE-B15 Computer Option 10
PC Compatible 10
Windows 3.1/3.11 10
Windows 95/98/NT 4 11

Removing the Software 12
Windows 3.1/3.11 12
Windows 95/98/NT 4 12

2 How to Use FS-K4 23

Creating an Analyzer Setup 23
Creating New Setup Files 23
Creating a New Limit Line 23
Creating a New Sweep Setup 24
Loading an Existing File 25
Saving a File 26
Saving an Unnamed File 26
Saving a Named File 26

Making a Measurement 27
Making a Sweep Measurement 27
Analyzing Sweep Results 28

Generating a Report 29
Setting up the Printer 29
Previewing a Report 29
Printing a Report 30

3 Menu Commands 31

File Menu 31
New command (File Menu) 31
Open command (File Menu) 31
Save command (File Menu) 32
Save As command (File Menu) 32
Print Preview command (File Menu) 33

Preview Setup command (File Menu) 33
Print command (File Menu) 34
Print Setup command (File menu) 34
Exit command (File Menu) 34

Edit Menu 35
Sweep Setup command (Edit Menu) 35
Report Setup 37
Advanced Sweep Setup 37
Limit Line command (Edit Menu) 39
Shift Level 40

View Menu 41
Graph command (View Menu) 41
Log command (View Menu) 41
Uncorrected command (View Menu) 41
Reference command (View Menu) 41
Corrected command (View Menu) 41
Residual PM command (View Menu) 42
Residual FM command (View Menu) 42

Sweep Menu 43
Start command (Sweep Menu) 43
Stop command (Sweep Menu) 43
Mode command (Sweep Menu) 43
Trace to Reference command (Sweep Menu) 44
Clear Reference command (Sweep Menu) 44

Marker Menu 45
Normal command (Marker Menu) 45
Delta command (Marker Menu) 45
Next Marker command (Marker Menu) 45
Measure at Marker command (Marker Menu)) 45
Zoom In command (Marker Menu)) 45
Zoom Out command (Marker Menu) 46
Original Diagram command (Marker Menu) 46

Options Menu 47
Measurement Log command (Options Menu) 47
Display command (Options Menu) 47
Default Paths command (Options Menu) 48
Analyzer command (Options Menu) 48
Save Options command (Options Menu) 49

Help Menu 50
Contents command (Help Menu) 50
Search for Help on command (Help Menu) 50
Obtaining Technical Support command 50
About FS-K4 command (Help Menu) 50

Control Menu 51
Restore command (Control menu) 51

Move command (Control menu) 51
Size command (Control menu) 51
Minimize command (Control menu) 51
Maximize command (Control menu) 51
Close command (Control menu) 52
Switch To command (Control menu) 52

4 Parts of the FS-K4 Screen 53

FS-K4 Control menu 53
Maximize button 53
Menu bar 53
Minimize button 53
Restore button 54
Status Bar 54
Title Bar 54
Workspace 55
Graph 55
Log 56
Markers 56

5 Keyboard and Mouse 59

Deleting and inserting text 59
Function keys 59
Moving the insertion point in a text entry field 60
Moving the marker 60
Re-measuring at the Marker 61
Selecting in a text entry field 61
Using Table Entry Boxes 61

6 Command Line Options 63

7 Communication Problems 65

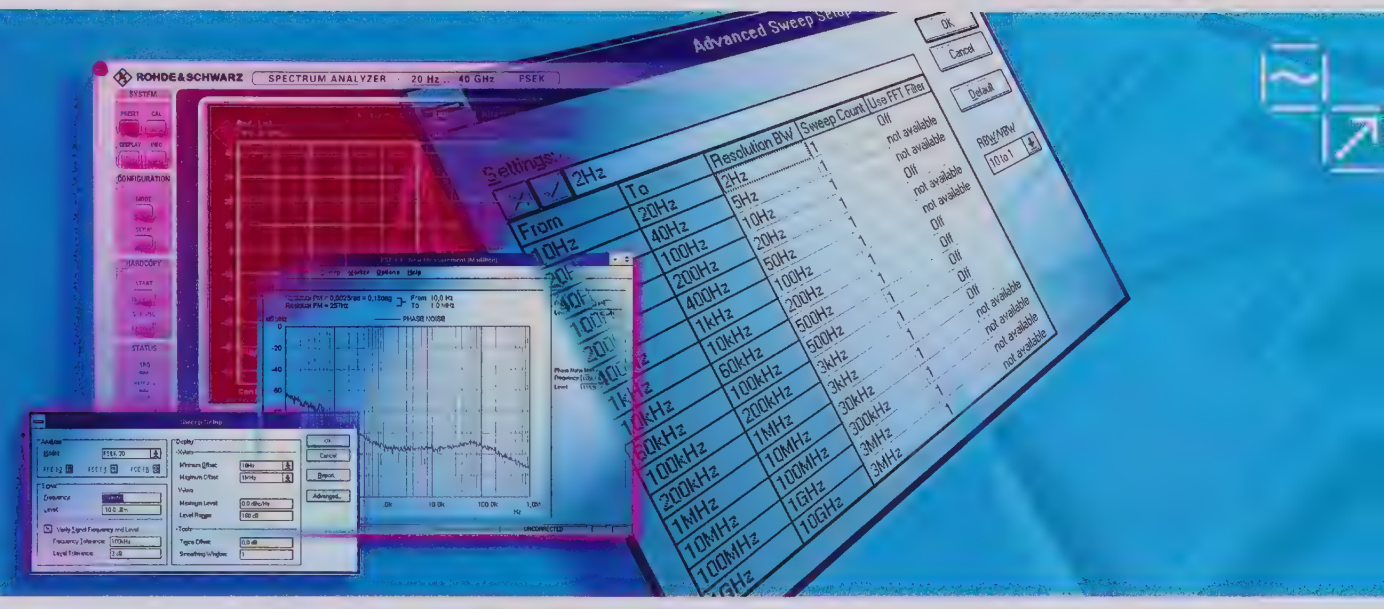
8 Data Storage Format 67

Conventions Used in Descriptions of Data Storage Format 67

Limit Line Files 67
Analyzer Setup Files 68
Result Data Files 70
Log Text Files 72
FS-K4.INI 74

9 Decision and Error Messages 77

10 Index

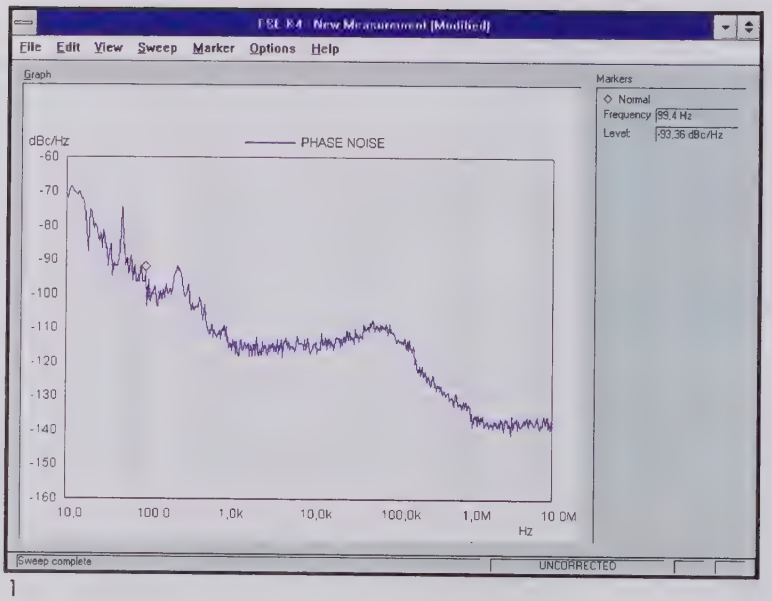


Phase Noise Measurement Software FSE-K4

Phase Noise Measurements with Spectrum Analyzer FSE

- Free editable sweep settings
- Fast residual FM/PM measurements
- Comprehensive marker functions
- Storage of results and settings
- Detailed screen printouts

ROHDE&SCHWARZ



1

- **Storage of results**
  Results can be stored on hard disk or floppy disk together with the associated analyzer settings for each result.
- **Fast residual FM/PM measurements**
  After the marker and delta marker in the phase noise graph are set, Software FSE-K4 instantaneously calculates the residual FM/PM of the measured phase noise. Residual PM is displayed in radians and degrees.
- **Limit Line**
  An editable limit line allows fast comparison of measurement results and given limits.

Phase noise measurements with FSE-K4

Phase Noise Measurement Software FSE-K4 extends the measurement capabilities of Rohde & Schwarz Spectrum Analyzer FSE to give a phase noise tester (1). FSE is ideal for this purpose because of its low inherent phase noise and noise figure.

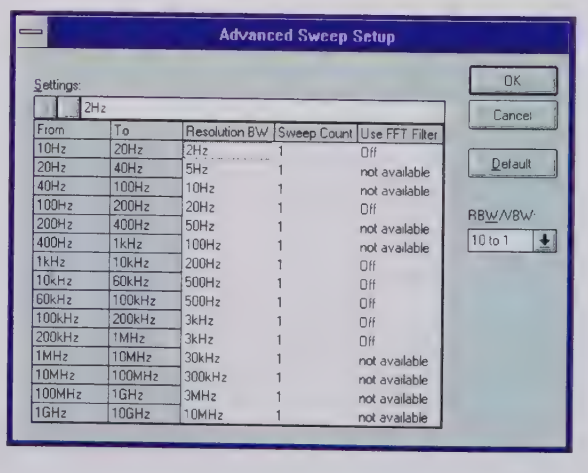
High measurement speed is achieved through the high sweep rates of FSE. It is possible to trade off speed against accuracy at small resolution bandwidths (≤1kHz) by using either FFT or digital filters. FSE-K4 allows for different settings in one phase noise graph, eg FFT close and analog/digital filters far off the carrier.

The software FSE-K4 runs under Microsoft Windows on FSE with controller function FSE-B15 fitted or on an external PC with GBIP controller.

Features of FSE-K4:

- **Marker functions**
  The numeric phase noise value for a given carrier offset can be displayed quickly with the marker function. Additionally, the FSE can be tuned to the marker frequency for continuous phase noise measurements at a given carrier offset.
- **Sweep settings (2)**
  The resolution bandwidth and sweep count can be set separately for each frequency range.
- **Detailed screen printouts**
  Screen printouts with editable comments allow for the quick and detailed documentation of measurement results.

2



From	To	Resolution BW	Sweep Count	Use FFT Filter
10Hz	20Hz	2Hz	1	Off
20Hz	40Hz	5Hz	1	not available
40Hz	100Hz	10Hz	1	not available
100Hz	200Hz	20Hz	1	Off
200Hz	400Hz	50Hz	1	not available
400Hz	1kHz	100Hz	1	not available
1kHz	10kHz	200Hz	1	Off
10kHz	60kHz	500Hz	1	Off
60kHz	100kHz	500Hz	1	Off
100kHz	200kHz	3kHz	1	Off
200kHz	1MHz	3kHz	1	Off
1MHz	10MHz	30kHz	1	not available
10MHz	100MHz	300kHz	1	not available
100MHz	1GHz	3MHz	1	not available
1GHz	10GHz	10MHz	1	not available

Specifications

Frequency range

FSEA20/30	9 kHz/20 Hz to 3,5 GHz
FSEB20/30	9 kHz/20 Hz to 7 GHz
FSEM20/30	9 kHz/20 Hz to 26,5 GHz
FSEK20/30	9 kHz/20 Hz to 40 GHz

Averaging

RBW/VBW ratio in video averaging	1:10, 1:1, 10:1
Trace averaging	implemented

Smoothing window 1 to 199 points

Carrier offset frequency range/number of decades

The maximum number of representable decades in a phase noise graph is defined by the carrier offset frequency range.

Analyzer model	FSEA20 FSEB20	FSEA30 FSEB30	FSEM20 FSEK20	FSEM30 FSEK30
Lower offset limit	100 Hz	10 Hz	100 Hz	10 Hz
Upper offset limit	1 GHz	1 GHz	10 GHz	10 GHz
Max. number of decades	7	8	8	9

Nominal measurement accuracy (RSS error, 95% confidence level)

Minimum phase noise level 95 dB below reference level, FFT deactivated, return loss of source >14 dB (VSWR <1.5 : 1), signal to noise ratio ≥10 dB

Signal level <7 dBm

Center frequency	≤3.5 GHz	≤7 GHz	≤18 GHz	≤26.5 GHz	≤ 40 GHz
Offset ≤10 MHz	1.9 dB	1.9 dB	2 dB	2 dB	2 dB
Offset >10 MHz	2.2 dB	2.2 dB	2.9 dB	3.4 dB	3.9 dB

Signal level >7 dBm

Center frequency	≤3.5 GHz	≤7 GHz	≤18 GHz	≤26.5 GHz	≤40 GHz
Offset ≤10 MHz	1.5 dB	1.6 dB	1.9 dB	1.9 dB	1.9 dB
Offset >10 MHz	1.8 dB	2 dB	2.9 dB	3.4 dB	3.9 dB

Repeatability (95% confidence level) ±0,8 dB
RBW/VBW 10:1, Trace Averaging <15, smoothing window ≥9

System phase noise

A systematic measurement uncertainty is introduced by the inherent phase noise of the measuring instrument. Figure 1 and Figure 2 show typical phase noise curves of the FSE models for two different center frequencies.

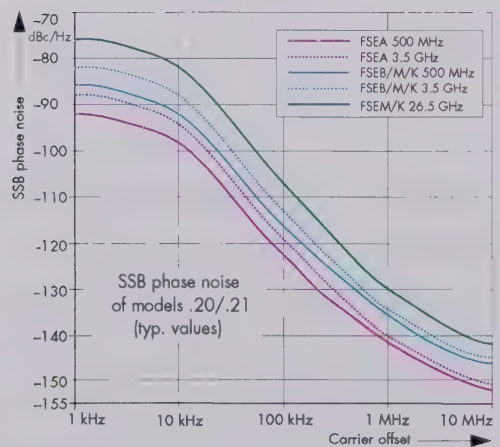


Figure 1: SSB phase noise of models .20

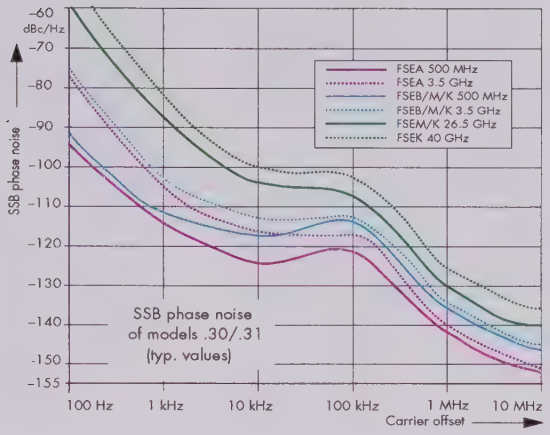


Fig. 2: SSB phase noise of models .30 and .20 equipped with option FSE-B4

System Requirements

Control via external PC/IEEE bus
CPU 486 or better, RAM ≥ 8 MB, Windows 3.1/3.11/95/98/NT4.0, IEE488 interface, AT/TNT/PCMCIA IEEE card

Control via FSE
Controller FSE-B15 for FSE

Ordering Information

Phase Noise Measurement Software FSE-K4	1108.0088.02

Recommended Options

Type	Description	Ordering Number
FSE-B4	Low Phase Noise and OCXO (for models .20)	1073.5396.02
FSE-B5	FFT Filter 1 Hz to 1 kHz (for models .20)	1073.5544.02
FSE-B15	Controller for FSE (DOS/Windows, English/German)	1073.5696.02/03

Fax Reply (Phase Noise Measurement Software FSE-K4)

❑ **Please send me an offer**

❑ **I would like a demo**

❑ **Please call me**

❑ **I would like to receive your free-of-charge CD-ROM catalog**
(Test&Measurement Products)

Others: _____

_____

_____

Name: _____

Company/Department: _____

Position: _____

Address: _____

_____

_____

Country: _____

Telephone: _____

Fax: _____

E-mail: _____

Printed in Germany 1098 (Bi as)

PD 0201.21 Trade names are trademarks of the owners Subject to change · Data without tolerances: typ values

ROHDE&SCHWARZ

ROHDE&SCHWARZ GmbH & Co. KG · Mühldorfstraße 15 · D-81671 München · P.O.B. 801469 · D-81614 München · Telephone +49894129-0
Internet: http://www.rsd.de · Customer Support: Tel. +491805124242 · Fax +4989 4129-3777 · E-mail: CustomerSupport@rsd.rsd.de

Certified Quality System

ISO 9001

DQS REG. NO 1954-04

Sehr geehrter Kunde,

Sie haben sich für den Kauf eines Rohde & Schwarz-Produktes entschieden. Hiermit erhalten Sie ein nach modernsten Fertigungsmethoden hergestelltes Produkt. Es wurde nach den Regeln unseres Qualitätsmanagementsystems entwickelt, gefertigt und geprüft. Das Rohde & Schwarz-Qualitätsmanagementsystem ist nach ISO 9001 zertifiziert.

Dear Customer,

You have decided to buy a Rohde & Schwarz product. You are thus assured of receiving a product that is manufactured using the most modern methods available. This product was developed, manufactured and tested in compliance with our quality management system standards.
The Rohde & Schwarz quality management system is certified according to ISO 9001.

Cher client,

Vous avez choisi d'acheter un produit Rohde & Schwarz. Vous disposez donc d'un produit fabriqué d'après les méthodes les plus avancées. Le développement, la fabrication et les tests respectent nos normes de gestion qualité.
Le système de gestion qualité de Rohde & Schwarz a été homologué conformément à la norme ISO 9001.

ROHDE&SCHWARZ

Adressen/Addresses

FIRMENSITZ/HEADQUARTERS

Telefon/Phone
Telefax
E-mail

ROHDE & SCHWARZ GmbH & Co. KG
Mühldorfstraße 15 · 81671 München — +49 89 41 29- 0
Postfach 801469 · 81614 München — +49 89 41 29- 12164
Internet: www.rohde-schwarz.com — –

WERKE/PLANTS

ROHDE & SCHWARZ Messgerätebau GmbH — +49 83 31 10 8-0
Riedbachstraße 58 · 87700 Memmingen — +49 83 31 10 81 124
Postfach 16 52 · 87686 Memmingen — –

ROHDE & SCHWARZ GmbH & Co. KG
Werk Teisnach — +49 99 23 8 57-0
Kaikenrieder Straße 27 · 94244 Teisnach — +49 99 23 8 571-1 74
Postfach 11 49 · 94240 Teisnach — –

ROHDE & SCHWARZ GmbH & Co. KG · Werk Köln — +49 22 03 49-0
Graf-Zeppelin-Straße 18 · 51147 Köln — +49 22 03 49-51 3 08
Postfach 98 02 60 · 51130 Köln — –

TOCHTERUNTERNEHMEN/SUBSIDIARIES

ROHDE & SCHWARZ Vertriebs-GmbH — +49 89 4129-120 07
Mühldorfstraße 15 · 81671 München — +49 89 4129-135 67
Postfach 801469 · 81614 München — customersupport@rohde-schwarz.com

ROHDE & SCHWARZ International GmbH — +49 89 4129-120 05
Mühldorfstraße 15 · 81671 München — +49 89 4129-135 97
Postfach 80 14 60 · 81614 München — –

ROHDE & SCHWARZ Engineering and Sales GmbH — +49 89 4129-137 11
Mühldorfstraße 15 · 81671 München — +49 89 4129-137 23
Postfach 80 14 29 · 81614 München — –

R&S BICK Mobilfunk GmbH — +49 50 42 9 98-0
Im Landerfeld 7 · 31848 Bad Münder — +49 50 42 9 98-105
Postfach 20 62 · 31844 Bad Münder — rsbick@rsbick.rohde-schwarz.com

ROHDE & SCHWARZ FTK GmbH — +49 30 6 58 91-122
Wendenschloßstraße 168, Haus 28 — +49 30 65 550-221
12557 Berlin — –

SIT Gesellschaft für Systeme
der Informationstechnik mbH — +49 30 6 58 84-2 22
Wendenschloßstraße 168, Haus 28 — +49 30 6 58 84-1 83
12557 Berlin — sit.info@sit.rohde-schwarz.com

Zweigniederlassungen der Rohde & Schwarz Vertriebs-GmbH/Branch offices of Rohde & Schwarz Vertriebs-GmbH

Zweigniederlassung Berlin — (+49 30) 34 79 48-0
Ernst-Reuter-Platz 10 · 10587 Berlin — (+49 30) 34 79 48-48
Postfach 100620 · 10566 Berlin — customersupport@rohde-schwarz.com

Zweigniederlassung Büro Bonn — (+49 2 28) 918 90-0
Josef-Wirmer-Straße 1–3 · 53123 Bonn — (+49 2 28) 25 50 87
Postfach 140264 · 53057 Bonn — customersupport@rohde-schwarz.com

Zweigniederlassung Hamburg — (+49 40) 63 29 00-0
Steilshooper Allee 47 · 22309 Hamburg — (+49 40) 630 78 70
Postfach 602240 · 22232 Hamburg — customersupport@rohde-schwarz.com

Zweigniederlassung Köln — (+49 22 03) 807-0
Graf-Zeppelin-Straße 18 · 51147 Köln — (+49 22 03) 807-50
Postfach 900149 · 51111 Köln — customersupport@rohde-schwarz.com

Zweigniederlassung Mitte — (+49 61 02) 20 07-0
Siemensstraße 20 — (+49 61 02) 80 00 40
63263 Neu-Isenburg — customersupport@rohde-schwarz.com

Zweigniederlassung München — (+49 89) 41 86 95-0
Mühldorfstraße 15 · 81671 München — (+49 89) 40 47 64
Postfach 801449 · 81614 München — customersupport@rohde-schwarz.com

Zweigniederlassung Nürnberg — (+49 9 11) 64203-0
Donaustraße 36 — (+49 9 11) 64203-33
90451 Nürnberg — customersupport@rohde-schwarz.com

Zweigniederlassung Telekommunikation — (+49 61 02) 20 07-0
Siemensstraße 20 — (+49 61 02) 20 07-12
63263 Neu-Isenburg — customersupport@rohde-schwarz.com

ADRESSEN WELTWEIT/ADDRESSES WORLDWIDE

Algeria
ROHDE & SCHWARZ Bureau d'Alger — (2) 59 24 53
5 B, Place de Laperrine — (2) 69 46 08
16035 Hydra-Alger — –

Argentina
Precisión Electrónica SRL — (14) 331 16 85
Av. Julio A. Roca 710 - Piso 6 — (14) 334 51 11
1067 Buenos Aires — preelctr@satlink.com

Australia
ROHDE & SCHWARZ — Sales (2) 8845 4100
(AUSTRALIA) Pty. Ltd. — (2) 9738 3988
Unit 6, 2-8 South Street — Service (2) 8845 4188
Rydalmere, N.S.W. 2116 — (2) 9638 0832
sales@rsaus.rohde-schwarz.com
service@rsaus. rohde-schwarz.com

Austria
ROHDE & SCHWARZ-ÖSTERREICH — (1) 6 02 61 41
Ges. m. b. H. — (1) 6 02 61 41-14
Sonnleithnergasse 20 — office@rsoe.rohde-schwarz.com
1100 Wien

Azerbaijan
ROHDE & SCHWARZ Azerbaijan — 12 93 31 38
Liaison Office Baku — 12 93 03 14
Azerbaijan Avenue 35 — –
370139 Baku

Baltic Countries
siehe/see Denmark

Bangladesh
Business International Ltd. — (2) 881 06 53
Corporation Office — (2) 882 82 91
House No: 95/A, Block -'F' — –
Road No: 4, Banani
Dhaka - 1213

Belgium
ROHDE & SCHWARZ BELGIUM N.V. — (2) 7 21 50 02
Excelsiorlaan 31 Bus 1 — (2) 7 25 09 36
1930 Zaventem — info@rsb.rohde-schwarz.com

Bolivia
siehe auch/see also Argentina

RIBCO LTDA. — (2) 32 84 03
Av. Mariscal Santa Cruz 1392 — (2) 39 30 47
Ed. Cámara Nacional — gibatta@caoba.entelnet.bo
de Comercio
Piso 10, Of.1010-1011
La Paz

Brazil
ROHDE & SCHWARZ DO BRASIL LTDA.
Av. Alfredo Egidio de — (11) 56 41 12 00
Souza Aranha, 177 — (11) 56 41 78 10
1° andar - Santo Amaro
04726-170 São Paulo- SP

Adressen/Addresses

Brunei
GKL Equipment PTE. Ltd. 276 06 26
#11-01 BP Tower 276 06 29
396, Alexandra Road gkleqpt@signet.com.sg
Singapore 119954
Republic of Singapore

Bulgaria
ROHDE & SCHWARZ (2) 963 43 34
Representation Office Bulgaria (2) 963 21 97
39, Fridtjof Nansen Blvd. rohdebg@rsoe.com
1000 Sofia

Canada
Kommunikationstechnik/Communications Equipment:
ROHDE & SCHWARZ CANADA Inc. (613) 592 80 00
555 March Rd. (613) 592 80 09
Kanata, Ontario K2K 2M5 –

Messtechnik/T & M Equipment:
TEKTRONIX CANADA, Inc. (416) 747 50 00
3280 Langstaff Road, Unit 1 (905) 760 72 41
Concord, Ontario L4K 5B6 –

Chile
DYMEQ Ltda. (2) 277 50 50
Avenida Larraín 6666 (2) 227 87 75
Santiago dymeq@entelchile.net

China
ROHDE & SCHWARZ (10) 64 31 28 28
Representative Office Beijing (10) 64 37 98 88
Parkview Center, Room 602 –
No. 2 Jiangtai Road,
Chao Yang District
Beijing 100016, P. R. China

Colombia
Ferrostaal de Colombia (1) 415 77 00
Av. Eldorado Nro. 97-03 Interior 2 (1) 413 18 06
Santafé de Bogotá, D.C. mc_fsc@multiphone.net.co

Costa Rica
siehe/see Mexico (EPSA)

Croatia
siehe/see Austria

Republic of Cyprus
HINIS TELECAST LTD. (4) 42 51 78
Agiou Thoma 18 (4) 42 46 21
Kiti
Larnaca 7550

Czech Republic
ROHDE & SCHWARZ – Praha, s.r.o. (2) 24 32 20 14
Pod Kastany 3 (2) 24 31 70 43
160 00 Praha 6 rohdecz@rsoe.com

Denmark
ROHDE & SCHWARZ DANMARK A/S 43 43 66 99
Ejby Industrivej 40 43 43 77 44
2600 Glostrup RSDK@post1.tele.dk

Ecuador
REPRESENTACIONES (2) 25 22 51
MANFRED WEINZIERL (2) 25 22 51
Guanguiltagua 72 (39-93) mweinzierl@accessinter.net
Urbanización Jardines del Batán
Quito

Egypt
U.A.S. Universal Advanced Systems (202) 455 67 44
31 Manshiet El Bakry St., Heliopolis (202) 256 17 40
11341 Cairo uas@intouch.com

El Salvador
siehe/see Mexico (EPSA)

Estonia
ROHDE & SCHWARZ DANMARK A/S (6) 14 31 20
Estonian Branch Office (6) 14 31 21
Narva mnt. 13
10151 Tallinn

Finland
Orbis Oy (9) 47 88 30
P.O. B. 15 (9) 53 16 04
00421 Helsinki info@orbis.fi

France
ROHDE & SCHWARZ FRANCE (1) 41 36 10 00
Immeuble "Le Newton" (1) 41 36 11 10
9-11, rue Jeanne Braconnier –
92366 Meudon-la-Forêt Cédex

Niederlassung/Subsidiary Rennes:
ROHDE & SCHWARZ FRANCE (2) 99 51 97 00
Sigma 1 (2) 99 41 91 31
Rue du Bignon –
35135 Chantepie

Niederlassung/Subsidiary Toulouse:
ROHDE & SCHWARZ FRANCE (5) 61 39 10 69
Technoparc 3 (5) 61 39 99 10
B.P.501 –
31674 Labège Cédex
Büros/Offices:
Aix-en-Provence (4) 94 07 39 94
(4) 94 07 55 11
Lyon (4) 78 29 88 10
(4) 78 29 94 71
Nancy (3) 83 54 51 29
(3) 83 55 39 51

Ghana
KOP Engineering Ltd. (21) 77 99 13
P.O. Box 11012 (21) 22 47 69
3rd Floor Akai House, Osu
Accra

Greece
MERCURY SA. (1) 722 92 13
6, Loukianou Str. (1) 721 51 98
10675 Athens mercury@hol.gr

Guatemala
siehe/see Mexico (EPSA)

Honduras
siehe/see Mexico (EPSA)

Hong Kong
Schmidt & Co. (HK) Ltd. 25 07 03 33
9/F North Somerset House 28 27 56 56
Taikoo Place frankwong@shk.schmidtgroup.com
979 King's Road
Quarry Bay, Hong Kong

Hungary
ROHDE & SCHWARZ (1) 203 02 82
Budapesti Iroda (1) 203 02 82
Etele ut. 68 rohdehu@rsoe.com
1115 Budapest

Iceland
siehe/see Denmark

India
ROHDE & SCHWARZ (11) 683 74 84
India Pvt. Ltd.
244, Okhla Industrial Estate rsindiad@vsnl.com
Phase - III
New Delhi 110 020

Indonesia
P.T. REKANUSA SOLUSI (21) 576 16 02
Menara Rajawali, (21) 576 16 04
24th floor –
Jl Mega Kuningan Lot # 5.1
Kawasan Mega Kuningan
Jakarta 12950

Iran
ROHDE & SCHWARZ IRAN (21) 8 73 02 82
Liaison Office - Reg. N° RFC 1947 (21) 8 73 02 83
Dr. Beheschty Ave., Pakistan Ave., –
12th Street N° 1
Tehran 15317

Adressen/Addresses

Ireland siehe/see Great Britain

Italy
ROHDE & SCHWARZ ITALIA S.p.a. (6) 41 59 81
Via Tiburtina 1182 (6) 41 59 82 70
00156 Roma –

Centro Direzionale Lombardo (2) 95 70 41
Via Roma 108 (2) 95 30 27 72
20060 Cassina de´ Pecchi (MI)

Japan
ADVANTEST Corporation (3) 33 42 75 53
RS Sales Department (3) 53 22 72 70
Shinjuku-NS Building, 4-1 yoshimu@inst.advantest.co.jp
Nishi-Shinjuku
Tokyo 163-08, Japan

Jordan
Middle East Development (6) 465 96 71
c/o Jordan Crown Engineering & Trading Co. (6) 465 96 72
P.O. Box 830414
Amman, 11183

Kazakhstan
ROHDE & SCHWARZ Kazakhstan 32 72 63 55 55
Liaison Office Almaty 32 72 63 46 33
Pl. Respubliki 15 –
480013 Almaty

Kenya
Excel Enterprises Limited (2) 55 80 88
Dunga Road (2) 54 46 79
P.O. Box 42 788
Nairobi

Korea
Hana Technica Corp. (2) 514 45 46
Seoul Kangnam, P.O. Box 1458 (2) 514 45 49
Young Dong Bldg. 4F hanateco@unitel.co.kr
63-16 Nonhyun-Dong, Kang Nam-Ku
Seoul

Kuwait
Group Five Trading & Contracting Co. 244 91 72
P.O. Box 26645 244 95 28
Safat 13127
State of Kuwait

Latvia
Rohde & Schwarz Danmark A/S (7) 50 23 55
Latvian Branch Office (7) 50 23 60
Merkela iela 21-301 rsdk@rsdk.rohde-schwarz.com
1050 Riga

Lebanon
Rohde & Schwarz International (1) 465 64 28 Ext. 303
Liaison Office Riyadh (1) 465 64 28 Ext. 229
PO Box 361
c/o Haji Abdullah Alireza & Co.
Riyadh 11411 – KSA

Liechtenstein siehe/see Switzerland

Lithuania
Rohde & Schwarz Danmark A/S 222 46 62
Lithuanian Office 222 46 62
Lukiskiu 5-228
2600 Vilnius

Luxembourg siehe/see Belgium

Malaysia
DAGANG TEKNIK SDN. BHD. (3) 7035503/7035568
No. 9, Jalan SS 4D/2 (3) 7 03 34 39
Taman People´s Park danik@tm.net.my
47301 Petaling Jaya
Selangor Darul Ehsan

Malta
ITEC – International Technology Ltd. 37 43 00
B'Kara Road 37 43 53
San Gwann itec@keyworld.net

Mexico
Vertrieb Kommunikationstechnik/
Sales of Communications Equipment:
ELECTROINGENIERIA de Precisión (5) 559 76 77
S.A. (EPSA) (5) 575 33 81
Uxmal 520 epsa@compuserve.com
Colonia Vertiz Narvarte
03600 Mexico DF

Vertrieb Messtechnik/Sales of T&M Equipment:
Tektronix S.A. de C.V. (5) 666 63 33
Periférico Sur 5000, 8° Piso (5) 666 63 36
Col. Insurgentes Cuicuilco
Del. Coyoacán
04530 Mexico, D.F.

Nepal
Abishek Trade Links (P) Ltd. (1) 25 69 30
P.O.B. 9700 (1) 24 25 73
Kathmandu Durbar@hotel.mos.com.np

Netherlands
ROHDE & SCHWARZ (30) 600 17 00
NEDERLAND B.V. (30) 600 17 99
Perkinsbaan 1 Rob.DenHartog@rsn.rohde-schwarz.com
3439 ND Nieuwegein

New Zealand
Nichecom (4) 232 32 33
Level 1 Tawa Plaza (4) 232 32 30
210 Main Rd / P.O.B. 56-045 ISDN (4) 237 30 10
Tawa, Wellington robin.hodgson@nichecom.co.nz

Nicaragua siehe/see Mexico (EPSA)

Nigeria
Ferrostaal (Nigeria) Ltd. (1) 262 00 60
27/29 Adeyemo Alkaija Street (1) 262 00 64
P.O. Box 72021
Victoria Island
Lagos

Norway
ROHDE & SCHWARZ NORGE 23 17 22 50
Østensjøveien 36, P.O.B. 103 BRYN 23 17 22 69
0611 Oslo –

Oman
T&M Equipment and Broadcasting:
Mustafa & Jawad Science & Industry Co. Ltd. 60 20 09
P.O. Box 3340 60 70 66
Post Code 112
Ruwi
Sultanate of Oman

Pakistan
TelcoNet Communications & (51) 26 30 72
Engineering (51) 26 32 11
213/D, Ordnance Road tnc@meganet.com.pk
Rawalpindi-Pakistan-46000

Panama siehe auch/see also Mexico (EPSA)

ELECTRONICO BALBOA S.A. 614 93 64
Av. El Paical, Edif. El Dorado 236 18 20
Urb. Los Angeles pdubois@ebsa.com
Panama City

Papua-New Guinea siehe/see Australia

Peru siehe auch/see also Argentina

BMP INGENIEROS S.A. (1) 225 40 30
Av. José Gálvez Barrenechea 645 (1) 475 15 13
Urb. Corpac - San Borja wmelgarejo@bmp.com.pe
Lima 41

Philippines
MARCOM Industrial Equipment, Inc. (2) 8 13 29 31
MCC P.O.Box 2307 (2) 8 17 05 07
6-L Mezzanine Suite, Vernida I
Condominium120 Amorsolo St.
Legaspi Village
Makati City/Philippines 3117

Poland
ROHDE & SCHWARZ (22) 860 64 90
Oddzial w Polsce (22) 860 64 99
ul. Stawki 2, Pietro 28 rohdepl@rsoe.com
00-193 Warszawa

Portugal
TELERUS
Sistemas de Telecomunicações, S.A. (21) 412 35 90
Rua General Ferreira Martins, Lote 6,2.°B (21) 412 36 00
1495 Algés telerus@mail.telepac.pt

Romania
ROHDE & SCHWARZ (1) 410 68 46
Representation Office Bucharest (1) 411 20 13
Uranus 98 rohdero@rsoe.com
Bloc U8, scara 2, etaj 5, ap. 36
76102 Bucuresti

Russian Federation
ROHDE & SCHWARZ (095) 234 49 62
Representative Office Moscow (095) 234 49 63
Kazachy per. 7 rohderus@rsoe.com
109017 Moscow

Saudi Arabia
Rohde & Schwarz Liaison Office
c/o Haji Abdullah Alireza Co. Ltd. (1) 465 64 28
P.O.B. 361 (1) 465 07 82
Riyadh 11411 –

Singapore
Vertrieb/Sales:
INFOTEL TECHNOLOGIES LTD. 287 68 22
19 Tai Seng Drive 284 95 55
Kinergy Building # 06-00 general@infotel.com.sg
Singapore 535222

Service:
Rohde & Schwarz
Support Centre Asia Pte. Ltd. 846 37 10
1 Kaki Bukit View 846 00 29
#04-05/07 Techview rssca@mbox4.singnet.com.sg
Singapore 415941

Slovak Republic
Specialne systemy a software, a.s. (7) 65 42 25 29
Svrcic ul (7) 65 42 07 68
84104 Bratislava 3s@internet.sk

Slovenia
ROHDE & SCHWARZ (61) 123 46 51
Representation Ljubljana (61) 123 46 11
Koprska 92 rohdesi@rsoe.com
1000 Ljubljana

South Africa
Protea Data Systems (Pty) Ltd (11) 786 36 47
Communications & Measurement (11) 786 58 91
Division Colin.Forbes@protea.co.za
Private Bag X19
Bramley 2018

Spain
ROHDE & SCHWARZ ESPAÑA (91) 334 10 70
Salcedo, 11 (91) 729 05 06
28034 Madrid rema@rsd.rohde-schwarz.com

Sri Lanka
LANKA AVIONICS (1) 95 66 78
658/1/1, Negombo Road (1) 95 83 11
Mattumagala –
Ragama

Sudan
SolarMan Co. Ltd. (11) 47 31 08
P.O. Box 11 545 (11) 78 17 25
Karthoum

Sweden
ROHDE & SCHWARZ SVERIGE AB (8) 605 19 00
Flygfältsgatan 15 (8) 605 19 80
12830 Skarpnäck info@rss.rohde-schwarz.com

Switzerland
Roschi Rohde & Schwarz AG (31) 922 15 22
Papiermühlestrasse 145, Postfach (31) 921 81 01
3063 Ittigen –

Syria
Electro Scientific Office (11) 231 59 74
Baghdad Street (11) 231 88 75
Dawara Clinical Lab. Building –
P.O.B. 8162
Damascus

Tanzania
Security Systems (T) Ltd. (22) 2 76 00 37
P.O. Box 7512 (22) 276 02 93
Dar Es Salaam

Taiwan
Lancer Communication Co., LTD. (2) 23 91 10 02
16F, No. 30, Pei-Ping East Road (2) 23 95 82 83
Taipei rosa.ho@lancercomm.com.tw

Thailand
Vertrieb Kommunikationstechnik/Sales Communications Equipment:
TPP Operation Co., Ltd. (2) 880 93 45
41/5 MoobanTarinee Boromrajchonnee Rd. (2) 880 93 47
Talingchan, Bangkok 10170 –

Vertrieb Messtechnik/Sales T & M Equipment:
Schmidt Scientific (Thailand) Ltd. (2) 643 13 30-9
212 Government Housing Bank Bldg. (2) 643 13 40
Tower II, 19th Floor, Rama 9 Rd.,
Huaykwang, Bangkapi, Bangkok 10320 –

Turkey
ROHDE & SCHWARZ (216) 385 19 17
Liaison Office Istanbul (216) 385 19 18
Bagdad Cad. 191/3, Ard. rsturk@superonline.com
81030 Selamicesme-Istanbul

Ukraine
ROHDE & SCHWARZ (044) 268 60 55
Representative Office Kiev (044) 268 83 64
ul. Patrisa Loumoumba, 4 rohdeukr@rsoe.com
252042 Kiev

United Arab Emirates
Service-Center für den Mittleren Osten/
Service Center for the Middle East:
ROHDE & SCHWARZ Emirates L.L.C. (2) 631 20 40
P.O.B. 31156 (2) 631 30 40
Abu Dhabi –

ROHDE & SCHWARZ (2) 63 35 670
Liaison Office Middle East (2) 63 35 671
P.O. Box 311 56
Abu Dhabi –

Vertrieb/Sales:
ROHDE & SCHWARZ Liaison Office Dubai (4) 39 44 829
P.O.B. 53726 (4) 39 44 794
Dubai –

R&S BICK Mobile Communication
P.O.B. 17466 (4) 81 36 75
JAFZ, LOB 04-028 (4) 81 36 76
Dubai –

United Kingdom
ROHDE & SCHWARZ UK Ltd. (12 52) 81 13 77
Ancells Business Park (12 52) 81 14 47
Fleet, Hampshire GU 13 8UZ –

Uruguay
siehe auch/see also Argentina

AEROMARINE S.A. (2) 400 39 62
Cerro Largo 1497 (2) 401 85 97
11200 Montevideo aeromar@adinet.com.uy

USA

Kommunikationstechnik/Communications Equipment:
ROHDE & SCHWARZ, Inc. (301) 459 88 00
4425 Nicole Drive (301) 459 28 10
Lanham, MD 20706 –

Messtechnik/T & M Equipment:
TEKTRONIX Inc. (800) 835 9433 Ext. 6630
P.O.B. 500, M/S 50-216 (800) 835 7732
Beaverton, OR 97076 –

Venezuela

EQUILAB TELECOM C.A. (2) 34 46 26
Centro Seguros La Paz (2) 239 52 05
Piso 6, Local E-61 r_ramire@equilabtelecom.com.ve
Ava. Francisco de Miranda
Boleita, Caracas 1070

Military customers only:
REPRESENTACIONES BOPIC S.A. (2) 985 21 29
Av. Diego Cisneros (2) 985 39 94
Centro Empresarial Los Ruices incotr@cantv.net
Of. 119, 1er piso
Los Ruices
Caracas

Vietnam

Schmidt Vietnam Co., Ltd. (4) 834 61 86
8/F, Schmidt Tower, Hanoi (4) 834 61 88
Intern. Technology Centre svnhn@schmidt group.com
Cau Giay, Tu Liem, IPO Box 89
Hanoi

Yugoslavia see/siehe Austria

Nicht aufgeführte Länder/Countries not listed:

ROHDE & SCHWARZ INTERNATIONAL GmbH
P.O.B. 80 14 69
81614 München / Germany
Please fax to +49 89 41 29 136 62

1 Installation Instructions

The following paragraphs describe how to install the software, and how to remove it.

Installation on the FSP analyzer requires some special steps, which are described in "Installing FS-K4 on FSP Analyzers" on page 13.

For a step-by-step introduction to using the product please see the section entitled "How to use FS-K4" in this manual, or on-line help.

Installing FS-K4 on FSEx, FSIQ, and ESI Analyzers

Hardware Setup

Spectrum Analyzer

If your FSEx, FSIQ, or ESI analyzer is suitably configured, no external PC will be required for phase noise measurements and your analyzer will constitute an independent phase noise test set.

FS-K4 is designed to work with firmware version 1.67 or better. If your Spectrum Analyzer is fitted with an earlier version, please ask your Rohde & Schwarz representative to arrange for an upgrade.

If you want to run FS-K4 on your Spectrum Analyzer, you must have the FSE-B15 Computer Option fitted. If you do not already have this option, please ask your Rohde & Schwarz representative for details.

PC Compatible

To control your FSE Spectrum Analyzer from a PC using FS-K4, you must first install a GPIB interface card in your computer, and then connect the PC and Spectrum Analyzer using a GPIB Cable. FS-K4 supports the following cards:

Supplier	Model
Rohde & Schwarz	PS-B4 model 04
National Instruments	PCII, PCIIA
National Instruments	AT-GPIB/TNT (PnP), AT-GPIB/TNT
National Instruments	PCMCIA-GPIB

Rohde & Schwarz can not guarantee or provide support for FS-K4 when used with any other manufacturer's GPIB interface products.

Before running FS-K4 please use the setup and self-test software, supplied with the card, to ensure that all driver settings are set to their default 'factory' condition, and that the board is functioning correctly. Please consult the documentation supplied with the card to learn how to do this.

Software Setup

Spectrum Analyzer, FSE-B15 Computer Option

To install FS-K4 on the FSE-B15 Computer Option, proceed as follows:

1. First connect the keyboard and mouse, and turn on the FSE.
2. Wait until the FSE has initialized
3. Press the ALT and Print Screen/Sys Rq keys together. The FSE display will switch to computer mode, showing the DOS prompt "C:\>".
4. Now follow the instructions, for the appropriate operating system, below.

Note: *You can switch the display back to Spectrum Analyzer mode, by pressing ALT + Print Screen again.*

PC Compatible

FS-K4 is designed to work with Windows 3.1, 3.11, 95, 98, and NT 4. Please make sure that one of these operating systems is installed before continuing.

To install FS-K4, simply follow the instructions, for the appropriate operating system, below.

Windows 3.1/3.11

To install FS-K4, proceed as follows:

1. Start Microsoft Windows.

   It is strongly recommended that you exit all Windows programs that may be running now. This includes anti-virus software, office suite toolbars, information management software, etc. If you want to check the Setup disks for viruses, do it now and then exit the anti-virus software.
2. Insert the installation disk in drive A.
3. From the File menu, choose Run.
4. Type a:\setup and press ENTER.
5. A message box will appear announcing that, "FS-K4 Setup is preparing the InstallShield® Wizard which will guide you through the rest of the setup process."
6. The Welcome screen will then appear, reminding you once again to exit all Windows programs in case they interfere with the Setup process. If necessary choose the Cancel button, exit any Windows programs, and go back to step 2. Otherwise, choose the Next button to continue.
7. Setup will then ask where you want to install FS-K4. It will suggest a default location, "C:\R&S\FS-K4", but you may change this if required by choosing the Browse button and selecting a new destination. Choose the Next button to continue.
8. Setup will then copy files from the Setup Disks to your hard disk.
9. Files are copied into the Windows System directory as well as the destination you selected for FS-K4. Some of these files may already be present on your hard drive, in which case the Setup Disk's file is only copied if it is newer than the Hard Drive's file. During this process, three gauges will show: the progress of each file as it is copied, the progress of each disk, and how much space is available on the destination drive.
10. Once all files have been copied, a new Program Manager group, called FS-K4, will be created containing the following icons:

FS-K4 - runs the application

Help - displays the on-line help without running the application

Read Me - displays this chapter in the NotePad text editor

Uninstall - removes the application

11. Finally, a message box will be displayed informing you that the installation is complete. Press the Finish button to exit Setup.

Windows 95/98/NT 4

To install FS-K4, proceed as follows:

1. Start Microsoft Windows

   It is strongly recommended that you exit all Windows programs that may be running now. This includes anti-virus software, office suite toolbars, information management software, etc. If you want to check the Setup disks for viruses, do it now and then exit the anti-virus software.

2. Insert the installation disk in drive A.
3. Click the Start button, and then click Run.
4. Type a:\setup and press ENTER.

   A message box will appear announcing that, "FS-K4 Setup is preparing the InstallShield® Wizard which will guide you through the rest of the setup process."

5. The Welcome screen will then appear, reminding you once again to exit all Windows programs in case they interfere with the Setup process. If necessary choose the Cancel button, exit any Windows programs, and go back to step 2. Otherwise, choose the Next button to continue.
6. Setup will then ask where you want to install FS-K4. It will suggest a default location, such as, "C:\R&S\FS-K4", but you may change this if required by choosing the Browse button and selecting a new destination. Choose the Next button to continue.
7. Setup will then copy files from the Setup Disks to your hard disk.

   Files are copied into the Windows System directory as well as the destination you selected for FS-K4. Some of these files may already be present on your hard drive, in which case the Setup Disk's file is only copied if it is newer than the Hard Drive's file. During this process, three gauges will show: the progress of each file as it is copied, the progress of each disk, and how much space is available on the destination drive.

   Once all files have been copied, a new Start menu folder, called FS-K4, will be created containing the following shortcuts:

FS-K4 - runs the application

Help - displays the on-line help without running the application

Read Me - displays this chapter in the NotePad text editor

Uninstall - removes the application

8. Finally, a message box will be displayed informing you that the installation is complete. Press the Finish button to exit Setup.

Removing the Software

If at any time you need to remove FS-K4 from your PC or Spectrum Analyzer, FSE-B15 Computer Option, simply follow the instructions, for the appropriate operating system, below.

Windows 3.1/3.11

To remove FS-K4, proceed as follows:

1. Start Microsoft Windows,
2. Switch *to Program Manager* and display the FS-K4 group,
3. Double click on the *Uninstall* icon,
4. Follow the instructions presented by the UNinstallShield® Wizard.

Windows 95/98/NT 4

To remove FS-K4, proceed as follows:

1. Start Microsoft Windows,
2. Click *Start*,
3. Point to *Programs*,
4. Point to *FS-K4*,
5. Click *Uninstall*,
6. Follow the instructions presented by the UNinstallShield® Wizard.

Installing FS-K4 on FSP Analyzers

If your FSP analyzer is suitably configured, no external PC will be required for phase noise measurements and your analyzer will constitute an independent phase noise test set.

To install and operate the FS-K4 software a PS/2 keyboard is necessary e.g. PSP-Z2 (Order No. 1091.4100.02). When using other type of keyboards without built-in roll-key it is recommended to connect a PS/2 mouse to the rear of the analyzer. Do not connect keyboard and mouse with the power switched on.

Prior to the installation of FS-K4 the internal connections between FS-K4 and the analyzer must be ensured:

- **Installation of network card driver** (with built-in option FSP-B16 this is already included in the installation of option)
- **Installation of TCP/IP network protocol**
- **Installation of RSIB interface libraries**.

Note: *The WINDOWS NT files required for the installation of network drivers, protocols and services are located in the "C:\I386" directory.*

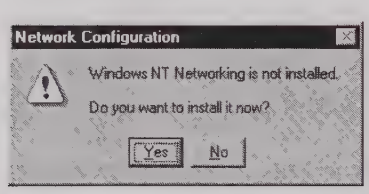
Installation of the network card driver for analyzers without the LAN interface option

The basic prerequisite for the installation of the TCP/IP protocol is that a network card driver is built in. In the absence of such a card a so-called loopback adapter takes over for the missing function. The adapter is part of the Windows NT.

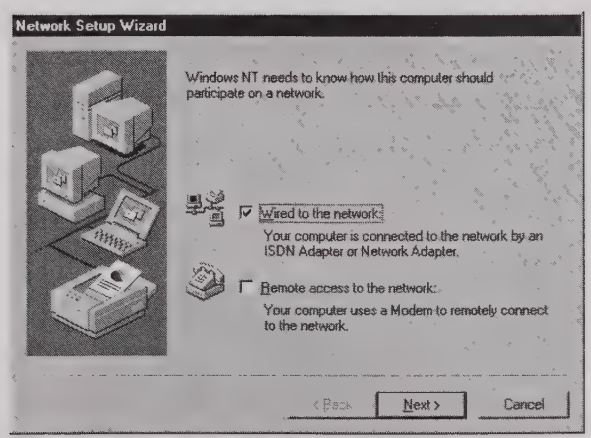
The installation procedure is as follows after the power-up of the analyzer and start of the firmware:

➢ Open the start menu of Windows NT with the key combination <CTRL>-<ESC> .

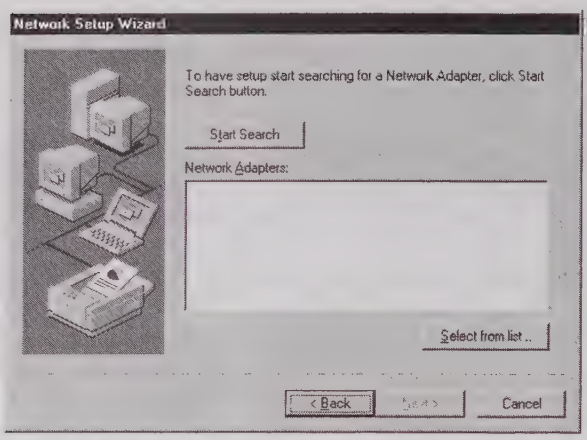
➢ Select menu items SETTINGS – CONTROL PANEL – NETWORK.



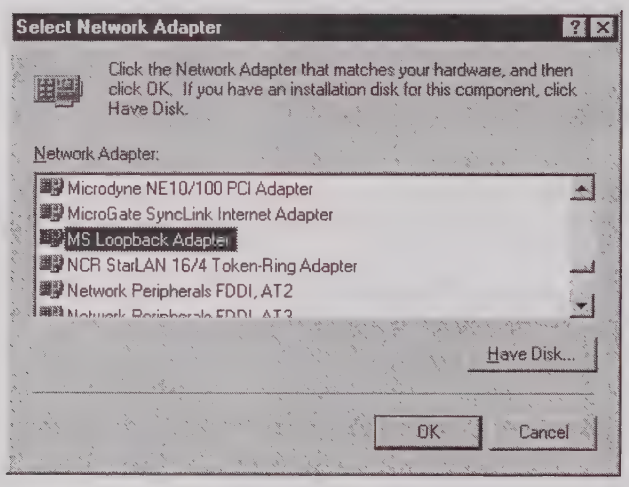
➢ Answer the question "Do you want to install it now?" with "Yes".


Network Setup Wizard
Windows NT needs to know how this computer should participate on a network.
Wired to the network
Your computer is connected to the network by an ISDN Adapter or Network Adapter.
Remote access to the network
Your computer uses a Modem to remotely connect to the network.
< Back
Next >
Cancel

➢ Leave the presetting "Wired to the network" unchanged and confirm with "NEXT".

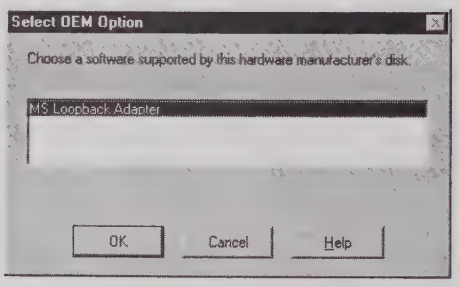

Network Setup Wizard
To have setup start searching for a Network Adapter, click Start Search button.
Start Search
Network Adapters:
Select from list...
< Back
Next >
Cancel

➢ Choose a network card by clicking "Select from list".


Select Network Adapter
Click the Network Adapter that matches your hardware, and then click OK. If you have an installation disk for this component, click Have Disk.
Network Adapter:
Microdyne NE10/100 PCI Adapter
MicroGate SyncLink Internet Adapter
MS Loopback Adapter
NCR StarLAN 16/4 Token-Ring Adapter
Network Peripherals FDDI, AT2
Have Disk...
OK
Cancel

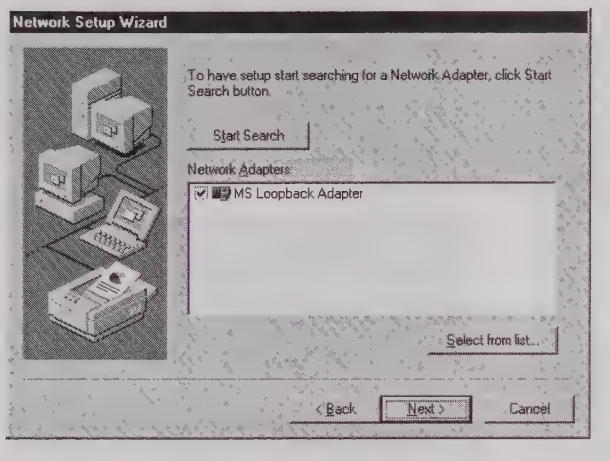
The OEM options appear.

➢ Click MS Loopback Adapter and confirm with OK.



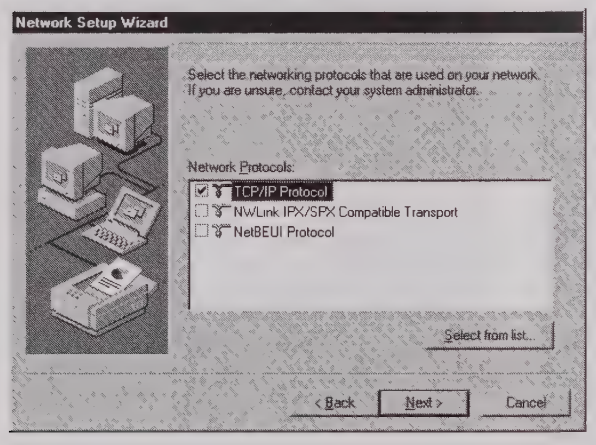
➢ If "Loopback" has already been selected, this select box appears:

➢ Confirm "MS Loopback Adapter" with "OK".



➢ Leave dialog with "MS Loopback Adapter" selected using "NEXT".

Installation of TCP/IP network protocol

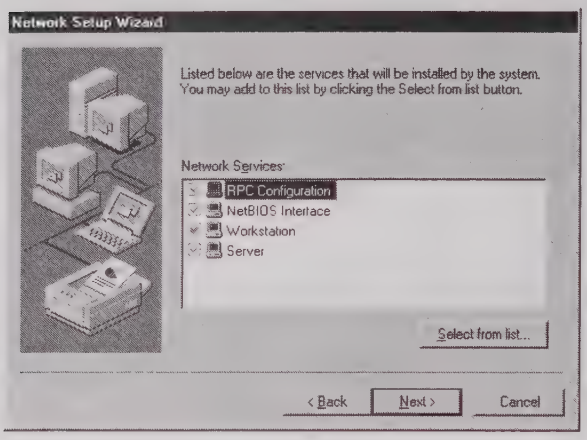

Network Setup Wizard
Select the networking protocols that are used on your network. If you are unsure, contact your system administrator.
Network Protocols:
TCP/IP Protocol
NWLink IPX/SPX Compatible Transport
NetBEUI Protocol
Select from list...
< Back
Next >
Cancel

➢ Select TCP/IP protocol and confirm with "NEXT".

Selection of network services

To be able to use the network resources it is necessary to install the corresponding services.

Note: *The network administrator knows which services are to be installed.*

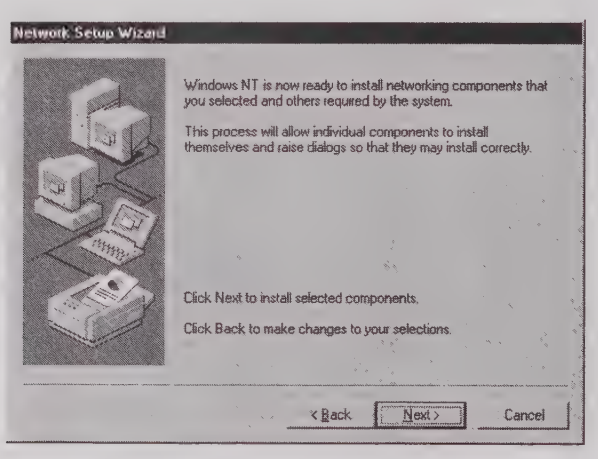

Network Setup Wizard
Listed below are the services that will be installed by the system. You may add to this list by clicking the Select from list button.
Network Services:
RPC Configuration
NetBIOS Interface
Workstation
Server
Select from list...
< Back
Next >
Cancel

➢ The selected services cannot be changed when installing for the first time.

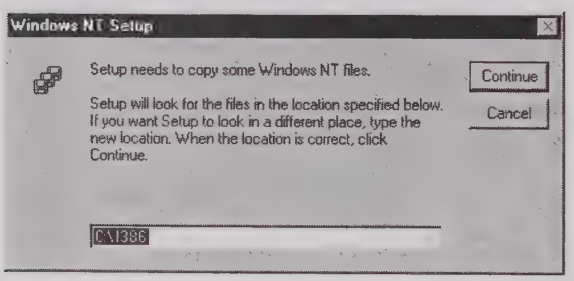
Further services may be added after the installation.

➢ Continue with "NEXT".

Termination of the installation

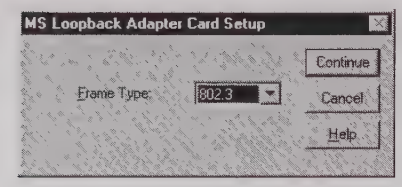

Network Setup Wizard
Windows NT is now ready to install networking components that you selected and others required by the system.
This process will allow individual components to install themselves and raise dialogs so that they may install correctly.
Click Next to install selected components.
Click Back to make changes to your selections.
< Back
Next >
Cancel

➢ Initiate installation by clicking "NEXT".


Windows NT Setup
Setup needs to copy some Windows NT files.
Setup will look for the files in the location specified below. If you want Setup to look in a different place, type the new location. When the location is correct, click Continue.
Continue
Cancel
C:\I386

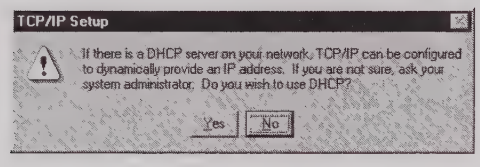
➢ Enter drive "C:\I386" and click "Continue".

A message box for selecting the frame type is opened.



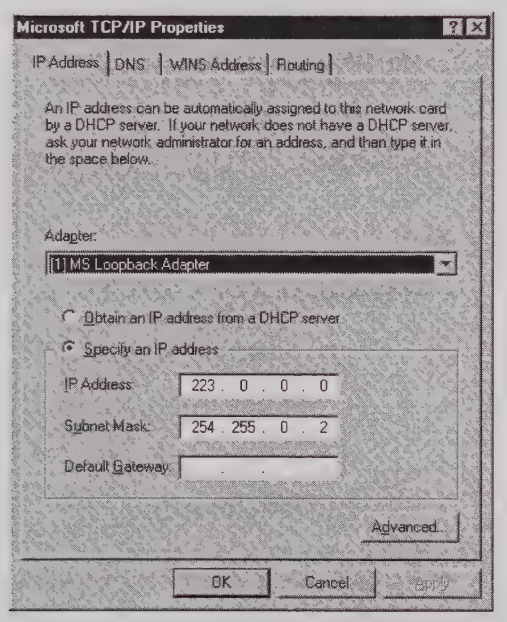
- Select Frame Type "802.3" and confirm with "Continue".

The dialog for selecting the TCP/IP properties is opened.


TCP/IP Setup
If there is a DHCP server on your network, TCP/IP can be configured to dynamically provide an IP address. If you are not sure, ask your system administrator. Do you wish to use DHCP?
Yes
No

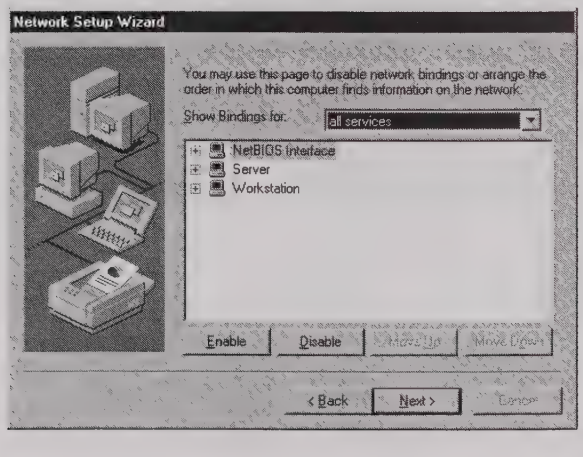
- Answer the question on the use of DHCP with "No".

The TCP/IP protocol is now installed.

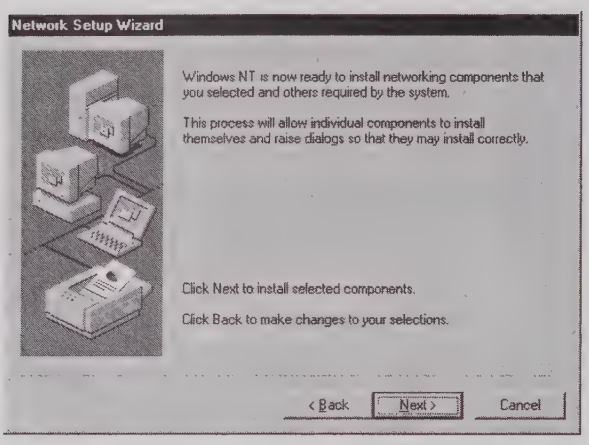

Microsoft TCP/IP Properties
IP Address
DNS
WINS Address
Routing
An IP address can be automatically assigned to this network card by a DHCP server. If your network does not have a DHCP server, ask your network administrator for an address, and then type it in the space below.
Adapter:
[1] MS Loopback Adapter
Obtain an IP address from a DHCP server
Specify an IP address
IP Address:
223 . 0 . 0 . 0
Subnet Mask:
254 . 255 . 0 . 2
Default Gateway:
Advanced...
OK
Cancel
Apply

- Do not change the selection of "Adapter".
- Click "Specify an IP address".
- Enter IP address "223 . 0 . 0 . 0" and Subnet Mask "254 . 255 . 0 . 2".
- Leave dialog with OK.

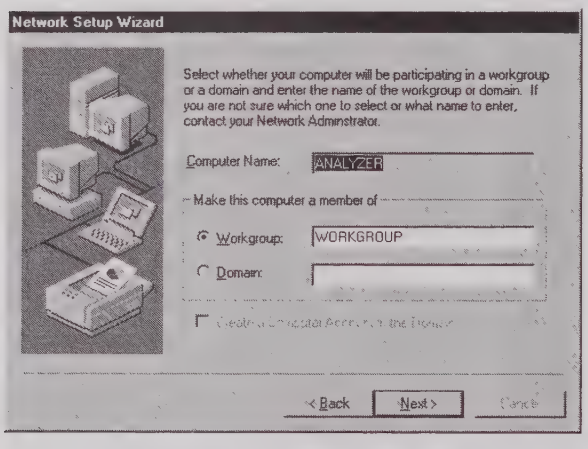
The Network Bindings display is opened.



- Do not change the setting and leave dialog with "Next".

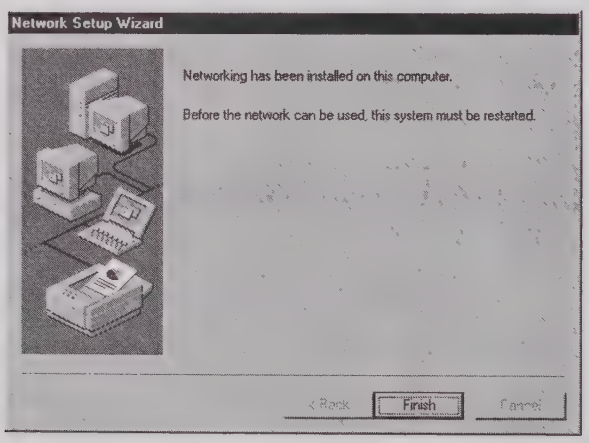

Network Setup Wizard
Windows NT is now ready to install networking components that you selected and others required by the system.
This process will allow individual components to install themselves and raise dialogs so that they may install correctly.
Click Next to install selected components.
Click Back to make changes to your selections.
< Back
Next >
Cancel

➢ Initiate the installation by clicking "Next".

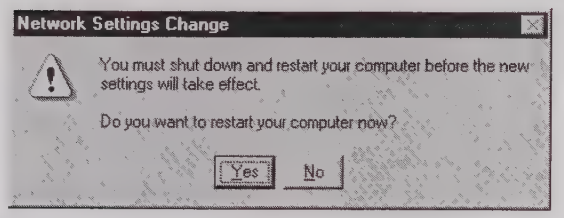

Network Setup Wizard
Select whether your computer will be participating in a workgroup or a domain and enter the name of the workgroup or domain. If you are not sure which one to select or what name to enter, contact your Network Administrator.
Computer Name:
ANALYZER
Make this computer a member of
Workgroup:
WORKGROUP
Domain:
< Back
Next >

➢ The preset computer and workgroup names "ANALYZER" and "WORKGROUP" can be confirmed with "NEXT".

Note:
The computer name in Windows network must be unambiguous.


Network Setup Wizard
Networking has been installed on this computer.
Before the network can be used, this system must be restarted.
< Back
Finish

➢ Terminate installation by clicking "Finish".

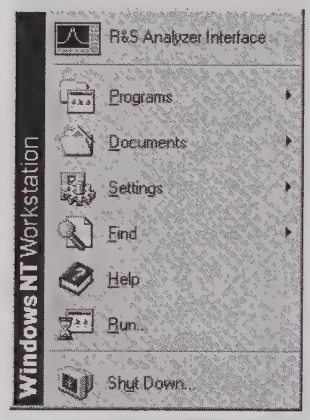

Network Settings Change
You must shut down and restart your computer before the new settings will take effect.
Do you want to restart your computer now?
Yes
No

➢ Answer the query "You must shutdown..." with "No" since after the installation of the network driver the "Service Pack 5" from Windows NT must be installed again.

➢ Close Control Panel by entering <ALT><F4>.

Re-installation of Service Pack

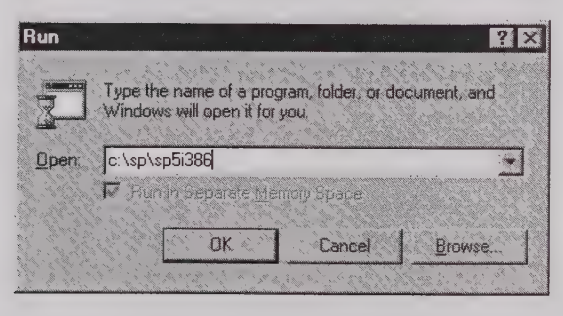
The installation of the Service Pack has to be repeated to avoid error messages "One or more services could not be started..." occurring during booting.



➢ Open the start menu of Windows NT with the key combination <CTRL><ESC>.

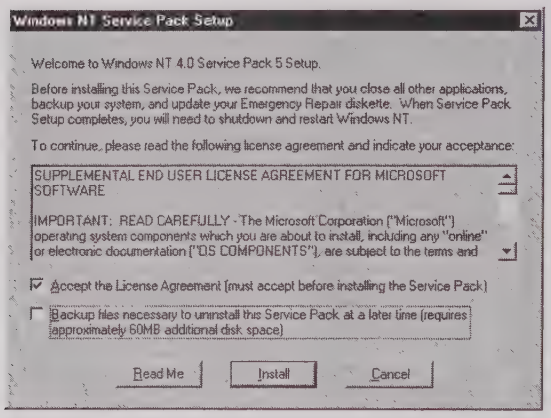
➢ Select item "RUN".

The input field for the program to be executed appears.



➢ Enter the command "C:\SP\SP5i386" conclude with OK.

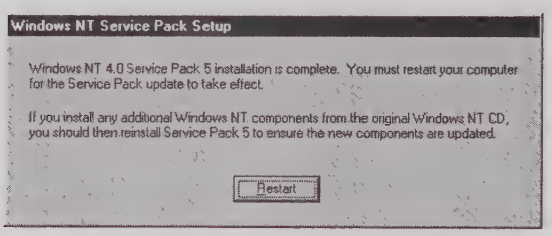
The installation of the Service Pack begins with the unpacking of the associated files.


Windows NT Service Pack Setup
Welcome to Windows NT 4.0 Service Pack 5 Setup.
Before installing this Service Pack, we recommend that you close all other applications, backup your system, and update your Emergency Repair diskette. When Service Pack Setup completes, you will need to shutdown and restart Windows NT.
To continue, please read the following license agreement and indicate your acceptance:
SUPPLEMENTAL END USER LICENSE AGREEMENT FOR MICROSOFT SOFTWARE
IMPORTANT: READ CAREFULLY - The Microsoft Corporation ("Microsoft") operating system components which you are about to install, including any "online" or electronic documentation ("OS COMPONENTS"), are subject to the terms and
Accept the License Agreement (must accept before installing the Service Pack)
Backup files necessary to uninstall this Service Pack at a later time (requires approximately 60MB additional disk space)
Read Me
Install
Cancel

- Answer the question on user license agreement with "Accept the License Agreement..."
- Remove marking at "Backup files necessary..." and conclude with "Install".

The files of the Service Pack are now installed.

***Note**:*
Backup of the files replaced by the Service Pack is not required.


Windows NT Service Pack Setup
Windows NT 4.0 Service Pack 5 installation is complete. You must restart your computer for the Service Pack update to take effect.
If you install any additional Windows NT components from the original Windows NT CD, you should then reinstall Service Pack 5 to ensure the new components are updated.
Restart

Once the installation is complete the request for restarting the instrument appears.

- Click the "Restart" button.

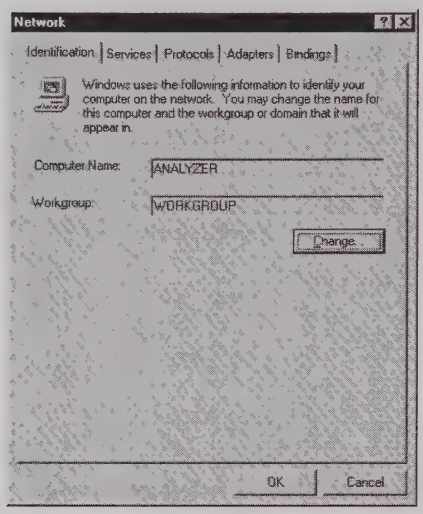
The instrument carries out a restart.

The installation of the network card driver is thus completed. Next, the FS-K4 software must be installed (see chapter "Installation of FS-K4 on FSP").

Installation of the network driver for instruments with the LAN interface option

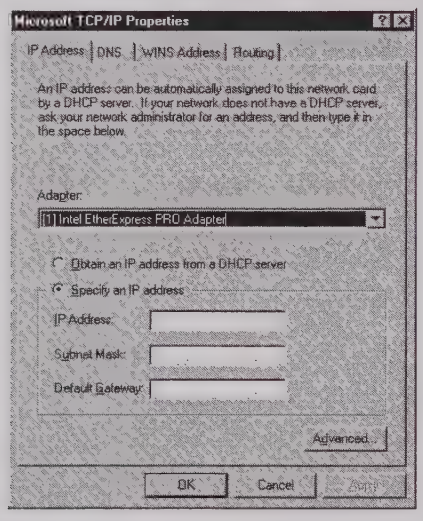
If the FSP-B16 option is built into the instrument, the basic condition for operating the FS-K4 is already effective. What remains to do is to ensure that the TCP/IP protocol has a correct configuration:

- Open the start menu of Windows NT with the key combination **<CTRL>-<ESC>**.
- Select menu items **SETTINGS – CONTROL PANEL – NETWORK.**



➢ Select the tag "Protocols".

The "Network Setup Wizard" appears.


Microsoft TCP/IP Properties
IP Address
DNS
WINS Address
Routing
An IP address can be automatically assigned to this network card by a DHCP server. If your network does not have a DHCP server, ask your network administrator for an address, and then type it in the space below.
Adapter:
[1] Intel EtherExpress PRO Adapter
Obtain an IP address from a DHCP server
Specify an IP address
IP Address:
Subnet Mask:
Default Gateway:
Advanced...
OK
Cancel
Apply

➢ Leave the selection "Adapter" unchanged.

➢ Click "Specify an IP address".

➢ Enter the IP Address and Subnet Mask assigned to the instrument. This address is given by the network administrator.

➢ Leave dialog with OK.

Installation of FS-K4 on FSP

➢ Insert the program diskette in drive A.

➢ Open the Windows NT start menu with <CTRL><ESC> and select "RUN".

➢ Enter the command "A:\SETUP" and terminate it with <ENTER> or by clicking "OK". The installation program of the FS-K4 is started and takes you through the subsequent installation.

➢ Follow the installation instructions on the screen.

➢ After the installation is completed, close the FS-K4 program group with <ALT><F4>.

➢ Open the Windows NT Explorer (via the start menu, see above) and copy the files D:\R_S\INSTR\RSIB\RSIB.DLL and D:\R_S\INSTR\RSIB\RSIB32.DLL into the directory C:\WINNT\SYSTEM32.

➢ Close the Windows NT Explorer with <ALT><F4>.

Starting FS-K4

- Open the Windows NT start menu with <CTRL><ESC>.
- Start FS-K4 by selecting the sequence PROGRAMS – FS-K4 – FS-K4 with the cursor or mouse (terminate entry with <ENTER> when using the cursor keys).
- FS-K4 is started and its window is opened.

Switchover of screen between FS-K4 and analyzer

- Press the key combination <ALT><TAB>, if necessary several times, to select "R&S Analyzer Interface" or "FS-K4"

Closing FS-K4

- Select the **Exit** command from the **File** menu or press the key combination **<ALT><F4>.**

Before the program is shut down, you are given the opportunity to save all settings including test results. If you would like to save, click the button Yes.
Software FS-K4 is thus closed down.

2 How to Use FS-K4

When measuring with FS-K4 there are three basic steps to work through:

1. Creating an Analyzer Setup, i.e., defining the sweep parameters and, if required, the limit line (p23),
2. Making a Measurement, i.e., performing the sweep, analyzing and storing the results (p27),
3. Generating a Report (p29)

Creating an Analyzer Setup

A complete Analyzer Setup consists of the following components:

1. Sweep Setup — Defines how each measurement should be made such as signal frequency and level, offset start and stop frequencies, display reference level and range, and report configuration.
2. Limit Line — Defines the maximum allowed noise level for each frequency in the measurement band.

In order to make a measurement you must have a Sweep Setup, however the Limit Line is optional.
You can load these components using any combination of the following methods:

1. Creating New Setup Files (p23)
2. Loading an Existing File (p25)

Once you have assembled and activated the necessary files in memory you can store the complete Analyzer Setup for later re-use, see Saving a File *(p26)*.

Creating New Setup Files

Before starting to make measurements with FS-K4 you should build a library of setup files. Sweep Setup files are dependent on Limit Line files, so you should create them in the order shown below.

1. Creating a New Limit Line (p23)
2. Creating a New Sweep Setup (p24)

Each Sweep Setup file will also contain an embedded copy of any Limit Line file that it uses.

Note: *When measurement results are saved, copies of all the files used to make the measurement are stored in the result data file. In this way future examination of results will remain independent of any setup file modifications that occur after a measurement is made.*

Creating a New Limit Line

To create a new limit line:

1. Choose New (p31) from the file menu.
2. Select Limit Line in the New box.
3. If you want to base the new limit on an existing one, choose a file name in the Template box. To help you, the description of the selected file name is displayed in the Description box.
4. Otherwise if want to create a new limit from scratch, choose none in the Template box.
5. Choose the OK button to load the selected template and open the Limit Line (p39) editor.
6. If you have chosen to work with a template file, it will be displayed in the editor. Otherwise, the editor will be empty.

7. First, enter a name for the new limit line in the Name box. This name is used to create the file name for the limit when stored to disk. Thus it is restricted to eight characters in length and may consist only of characters which may be used in a DOS file name.
8. Now enter limit line samples into the Values table entry box.
9. To enter a new frequency in the left hand column of the table, move the highlight to the correct cell and type the new value. To specify a unit of measurement, append Hz, kHz, MHz or GHz to the value. In each case, the first letter is sufficient in either upper or lower case. To accept the new value either click on the tick button, or press the TAB key, or press the ENTER key. To reject the new value and retain the old one either click on the cross button, or press the ESCAPE key.

   Note: *The ENTER and ESCAPE only behave as described above when the insertion point appears in the value entry box to the right of the tick button. Normally, the ENTER key corresponds to the highlighted button and the ESCAPE key corresponds to the Cancel button.*

1. To enter a new level in the right hand column, simply move to the correct row, type the value in dBc/Hz and accept it. There is no need to enter the unit of measurement.
2. You must enter at least two samples in ascending order of frequency with the lowest frequency at the top of the table. The total number of samples entered is shown by the Samples field.
3. If you enter an illegal or out-of-range value, a message will be displayed in the Status Bar (p54) showing the range of acceptable values
4. If you did not load a template file, choose the Activate button to turn the limit line on.
5. Finally, choose the OK button to confirm the new limit line.

You can store the new limit line for later re-use, see Saving a File *(p26)*.

Creating a New Sweep Setup

To create a new Sweep setup:

1. Choose New (p31) from the file menu.
2. Select Analyzer Setup in the New box.
3. If you want to base the new setup on an existing one, choose a file name in the Template box. To help you, the description of the selected file name is displayed in the Description box.
4. Otherwise if you want to create a new setup from scratch, choose none in the Template box
5. Choose the OK button to load the selected template and open the Sweep Setup (p35) editor.
6. If you have chosen to work with a template file, it will be displayed in the editor. Otherwise, the editor will be pre-set to the default setup for the current Analyzer type.
7. First choose the Analyzer type and options with which the new setup will be used. This controls the range of frequencies that may be used, and the availability of FFT Filters..
8. Enter the frequency of the carrier you wish to measure in the Signal Frequency box. You can specify the unit by appending GHz, kHz, MHz or GHz. In each case, the first letter is sufficient in either upper or lower case.
9. In the Signal Level box, enter the magnitude of the carrier in dBm. This value is used to set the analyzer reference level.
10. If you do not know the precise frequency of the carrier you wish to measure, select the Verify Signal Frequency and Level box. This enables a search, within a defined frequency tolerance range relative to the specified Signal Frequency, for the carrier of greatest magnitude. The frequency and level of this carrier are then accurately measured. If the resultant level is less that the specified Signal Level less a defined Level Tolerance, the measurement is aborted. Otherwise, the resultant frequency is used in place of the specified Signal Frequency, and the measured level is used to set the analyzer reference level, overriding the value specified in the Signal Level box.
11. If enabled, enter a value in the Frequency Tolerance box. This defines the offset, either side of the specified Signal Frequency, within which the carrier is guaranteed to be. FS-K4 will search for a carrier between Signal Frequency - Frequency Tolerance and Signal Frequency + Frequency Tolerance.

12. If enabled, enter a value in the Level Tolerance box. This defines the offset relative to the specified Signal Level above which the carrier is guaranteed to be.
13. The Minimum Offset and Maximum Offset boxes allow you to select the range of frequencies to measure. Each contains a list of positive offsets from the carrier. The Maximum Offset must be greater than the Minimum Offset, and the Signal Frequency + Maximum Offset must be less than or equal to the maximum frequency of the analyzer.
14. The Maximum Level and Level Range boxes refer to FS-K4's Graph rather than the analyzer display. The Maximum Level is specified in dBc/Hz since the displayed data is normalized to the carrier level.
15. The trace may be offset by a fixed number of dBs entered in the Trace Offset box.
16. Optionally the trace may also be smoothed by calculating the average of samples in a sliding window, see Smoothing Window in Sweep Setup (p35) for details.
17. Choose the Report button to display the Report Setup *(p37)* dialogue box. This allows you to set initial values for various report text fields, and select which elements of the report to include. Once these values are set, choose the OK button to accept any changes
18. In special circumstances you can further optimize the measurement by modifying the parameters shown in the Advanced Sweep Setup *(p37)* dialogue box. To open this choose the Advanced button, then once new values have been set, choose the OK button to accept any changes.
19. Choose the OK button in the Sweep Setup dialogue box to confirm the new Sweep setup.

Loading an Existing File

To load an existing file from disk:

1. Choose Open (p31) from the file menu.
2. If you wish to load a file from a default directory, as defined in the Default Paths (p48) dialogue box, check the Jump to default directories box.
3. Otherwise, make sure that this box is unchecked.
4. Select the type of file you wish to load in the List Files of Type box.
5. If Jump to default directories is checked, FS-K4 will automatically display the contents of the chosen file type's default directory and you should skip steps 4 and 5.
6. Select the drive containing the file you want to load in the Drives box.
7. Select the directory containing the file you want to load in the Directories box.
8. Type the name of the file you want to load in the File Description box or select it in the file list box below.
9. Choose the OK button to confirm your selection and load the file.
10. If loading the chosen file will affect any unsaved changes to the files in memory, FS-K4 will ask if you want to save the changes. You will be asked this question for each modified file, and if you decide to save a modified file the Save As (p32) dialogue box will be displayed.
11. If there is measured data in memory and loading the chosen file will directly affect the way in which a measurement is made, FS-K4 will warn you that all measured data will be discarded.

Exactly how the contents of memory gets changed depends on the type of file loaded as shown in the table below:

File of Type	Affected Memory Files
Limit Line	The selected limit line only.
Analyzer Setup	The Sweep Setup, and Limit Line are changed and any Result Data discarded.
Result Data	The Sweep Setup and Limit Line are changed and any Result Data discarded. Reference data if any, is loaded into the reference trace. Sweep Data is loaded into the main trace.

If you have loaded a limit line, the file will be activated.

Saving a File

There are two ways of saving a file to disk, namely Save and Save As. Which one you use depends on whether the file has previously been named or not.

The exact contents of the saved file depends on its type as shown in the table below:

File of Type	Contents
Limit Line	The selected limit line only.
Analyzer Setup	The current Sweep Setup and any activated Limit Line.
Result Data	The Sweep, the Reference Trace if any, the current Sweep Setup and any activated Limit Line.

Saving an Unnamed File

To save a new file to disk:

1. Choose Save As (p32) from the File menu.
2. If you wish to save a file to a default directory, as defined in the Default Paths (p48) dialogue box, check the Jump to default directories box.
3. Otherwise, make sure that this box is unchecked.
4. Select the type of file you wish to save in the List Files of Type box.
5. If Jump to default directories is checked, FS-K4 will automatically display the contents of the chosen file type's default directory and you should skip steps 4 and 5.
6. Select the drive you want to save the file on in the drives box.
7. Select the directory you want to save the file in with the Directories box.
8. Type the name and description you want to save the file under in the File Description box or select an existing name from the file list box below.
9. If you are saving a Limit Line, the file name will be set to that specified in the limit editor and you will not be able to modify it. However, you can still enter a description.
10. Choose the OK button to confirm your selection and save the file.

Saving a Named File

To save a previously named file:

1. Choose Save (p32) from the File menu.
2. Select the type of file you wish to save in the File of Type box. To help you, the description of the file currently in memory is displayed in the Description box.
3. Choose the OK button to confirm your selection and save the file using the existing name and description.

Making a Measurement

Measuring with FS-K4 consists of three steps:

1. Making a Sweep Measurement (p27)
2. Using the Marker menu commands for Analyzing Sweep Results (p28)
3. Storing the results for later re-use, as described in Saving a File (p26).

In cases where the phase noise of the unit under test is comparable to the inherent phase noise of the analyzer, a two stage measurement may be used to improve the accuracy of the final result.

To make a two stage measurement:

1. First connect a reference source to the analyzer.
2. Make a Sweep Measurement as described above.
3. Choose Trace to Reference *(p44)* from the Sweep menu to copy the trace into the reference buffer.
4. Now connect the unit under test.
5. Make a second Sweep Measurement.
6. Choose Corrected *(p41)* from the View menu.
7. The application will perform a linear subtraction of the reference trace from the uncorrected trace, and plot the result.

Once a two stage measurement is complete you can

- Switch back to the uncorrected trace by choosing Uncorrected *(p41)* from the View menu.
- Display the reference trace by choosing Reference *(p41)* from the View menu. The Normal and Delta marker displays will change to include calculated level offsets from the marker level to the reference trace.

To stop using the Reference Trace:

- Choose Clear Reference (p44) in the Sweep menu.

Making a Sweep Measurement

To run a Sweep:

- Choose Start (p43) from the Sweep menu.

The Analyzer will be configured according to the current Analyzer Setup. If this fails, an information dialogue will be displayed describing the problem and the measurement will be aborted.

If the Verify Frequency and Level function is selected in the Sweep Setup (p35) dialogue box, FS-K4 will then check to see if there is a Signal within the specified Frequency and Level Tolerance ranges relative to the specified Signal Frequency and Level. If no Signal is found, or a Signal is found, which is outside the tolerance range, an information dialogue will be displayed describing the problem, and the measurement will be aborted.

After a short delay the Analyzer will start measuring and automatically uploading the Sweep results to the computer. The Status Bar (p54) message changes to read "Sweep running...(0%)", and as data is received the value inside the parentheses is updated to show the ratio of samples received to the total expected, expressed as a percentage.

The overall sweep is divided into a number of sub-bands, which are measured separately. This is optimized to provide the best combination of measurement accuracy and speed.

If the Graph is visible, data will be plotted as soon as it is received. In many cases, the Sweep will generate more samples than can be displayed. A data reduction algorithm is used to ensure that the level represented by each pixel column in the displayed trace represents the maximum value measured for the band of frequencies it represents. This data reduction process does not affect the raw data uploaded from the Analyzer; which may be viewed, once the sweep is complete, by zooming in until every pixel column represents a single raw data sample. FS-K4 can store up to 20,000 samples in memory.

If the RF Overload warning is activated whilst measuring a sub-band, the input attenuation will be increased by 10dB and the sub-band will be re-measured.

If the sweep cannot be completed for any reason, an information dialogue will be displayed describing the problem and the measurement will be aborted.

Whilst the sweep is in progress you can:

1. Use the Normal (p45) and Delta (p45) Markers. These may be turned on using the commands in the Marker menu and moved along the trace using either the keyboard cursor keys, or by positioning the mouse pointer and then clicking the left mouse button.
2. Abort the sweep by choosing Stop (p43) from the Sweep menu. An information dialogue will be displayed confirming this action and the measurement will be aborted.

Analyzing Sweep Results

The Marker menu provides a number of tools to help you examine the phase noise trace.

1. The Normal *(p45)* marker displays the phase noise level measured at a specific frequency.
2. The Delta *(p45)* marker displays the offset frequency and level relative to the Normal marker.
3. When the Delta marker is enabled, Next Marker *(p45)* allows you to select which marker's frequency may be varied using the mouse and/or cursor keys.
4. Use the Measure at Marker *(p45)* command in the Marker menu to re-measure phase noise at the current marker frequency.
5. The Zoom function allows you to view the Sweep results in greater detail, ultimately removing the effects of data compression so that the raw data is displayed.

   If the marker is in Normal mode, the Zoom In *(p45)* command will redraw the Graph, changing the frequency span to show one tenth of the previous span, centered on the marker frequency. Zoom In may be used repeatedly until only raw data is displayed, with no data reduction. Zoom Out *(p46)* has the opposite effect, increasing the span by a factor of ten centered on the marker, whilst Original Diagram *(p46)* returns the display to the span defined by the Sweep Setup.

   When the marker is in Delta mode, Zoom In changes the span to show frequencies between the reference and delta markers.

In addition, the View menu provides two extra commands for displaying calculated values for Residual Phase Modulation and Residual Frequency Modulation respectively. When the Delta marker is enabled, the calculation is performed on the measured values lying between the two markers. Otherwise, all measured values are taken into account.

Generating a Report

There a three steps to consider when generating a measurement report:

1. Setting up the Printer (p29)
2. Previewing a Report (p29)
3. Printing a Report (p30)

You can store the Result Data for later re-use, see Saving a File *(p26)*.

Setting up the Printer

To setup the printer:

1. Choose Print Setup (p34) from the File menu.
2. Select the output device you want to use in the Printer box.
3. In the orientation box, select Portrait.
4. FS-K4 is designed to print reports in portrait mode. Use of other formats may lead to unpredictable results.
5. If you are using an HP Laser Jet type printer, choose the Options button to display the Options dialogue box. Select Line Art in the Dithering box then choose the OK button to accept the changes. Finally choose the OK button in Print Setup to accept the changes.

Note: *Some drivers such as the HP Plotter cannot be selected from FS-K4. In this case you should use the Printer Setup command in Print Manager's Options menu.*

Previewing a Report

To preview a report before printing:

1. Choose Print Preview (p33) from the File menu.
2. The Print Preview window will appear showing how a report would appear with the current report setup and measurement results.
3. To view the following page, choose the Next button.
4. Choose the Previous button to go back one page.
5. To change the report setup choose the Setup button.
6. The Preview Setup (p33) dialogue will be displayed allowing you to customize the report for the current unit under test. For example, you may enter the Make, Model, and Serial Number. When you save your measurement results, these changes will be saved in the Result Data file. However, they will not affect the Sweep Setup, so when you start a new Sweep measurement, any changes made here will be lost. If you want to make permanent changes, use the Sweep Setup editor and then save the Analyzer Setup.
7. Choose Print to send the report to a printer.
8. Choose the Close button to exit the Print Preview window.

Printing a Report

To print a report without using Print Preview :

- Choose Print (p34) from the File menu.

  The "Printing in progress" message box will appear containing a small picture of a printer, a page counter, and a Cancel button. As the print job progresses, sheets of paper will appear to feed through the printer and the counter will increment.

  If Print Manager is enabled, FS-K4 will print the Test Report immediately and Print Manager will handle any problems with the printer.

  Otherwise, the speed of report generation will be governed by the printer and Windows will handle any problems directly.

  Choosing the Cancel button will abort the report generation process, however you may have to clear the Print Manager or printer buffer.

3 Menu Commands

This chapter describes all menu commands and their dialogue boxes. The menus are arranged as in the menu bar *(p53)*.

File Menu

The File menu comprises the commands used for creating, opening, saving, printing files and for exiting FS-K4.

New command (File Menu)

Use this command to create new Analyzer Setups, and Limit Lines, or to load an existing Analyzer Setup prior to making a new measurement. In each case you can select a template file on which to base the new file or measurement. You can open an existing file with the Open *(p31)* command.

Dialogue Box Options

New

Select the type of new file you want to create.

Measurement	Loads a Analyzer Setup and prepares for a new Sweep.
Analyzer Setup	Loads a template file and opens the Analyzer Setup editor.
Limit Line	Loads a template file and opens the Limit Line editor.

Use Template

Select the name of the template file you want to use for the new file or measurement. FS-K4 lists template files, which are stored at the locations defined in the Default Paths *(p48)* dialogue box, and stored in your FS-K4.INI file. If you select *none* as the template for a new Limit file, the editor will be empty. On selecting *none* for a new Analyzer Setup, the editor will be filled with the default settings for the Analyzer.

Description

Whenever a file is saved, a long description may be entered at the right hand side of the File Description box in the Save As dialogue box. This information is read from the template file you select in the Use Template box and displayed in the Description box.

Open command (File Menu)

Use this command to open an existing Analyzer Setup, Limit Line, or Result Data file. You can create new files with the New *(p31)* command.

Dialogue Box Options

File Description

Type or select the filename you want to open. This box lists file names and descriptions of the files with the extension you select in the List Files of Type box.

List Files of Type

Select the type of file you want to open.

Analyzer Setup (*.set)	Lists all the files saved with the .SET extension.
Result Data	Lists all the files

(*.dat)	saved with the .DAT extension.
Limit Line	Lists all the files
(*.lim)	saved with the .LIM extension.

Note: *See Jump to default directories below.*

Drives

Select the drive on which FS-K4 stores the file that you want to open.

Directories

Select the directory in which FS-K4 stores the file you want to open.

Jump to default directories

Enables automatic setting of the default drive and path each time you change to a different file type using the List Files of Type box.

Save command (File Menu)

Use this command to save an active file with its current name and description. When you save a new file for the first time, FS-K4 displays the Save As dialogue box so you can name the file. If you want to change the name or description of an existing file before you save it, choose the Save As *(p32)* command.

Dialogue Box Options

File of Type

Select the type of file you want to save.

Analyzer Setup	Saves the current Analyzer Setup file.
Result Data	Saves the current Result Data file.
Limit Line	Saves the current Limit Line file.

Description

Whenever a file is saved, a long description may be entered at the right hand side of the File Description box in the Save As dialogue box. This information for current file, of the type you select in the File of Type box, is displayed in the Description box.

Save As command (File Menu)

Use this command to save, name and describe the active file of a specified data type.

Note: *To save a file with its existing name and description, use the Save* (p32) *command.*

Dialogue Box Options

File Description

Type a new filename in the left hand box to save a file with a different name.
Use the current name, or select a name in the list to save a file with an existing filename.
A filename can contain up to eight characters and an extension of up to three characters. FS-K4 adds the extension for the data type you specify in the List Files of Type box. Filenames for Limit files must be defined using the corresponding editor and cannot be modified by the Save As dialogue box.
Type a new file description or modify an existing one in the right hand side of the box.

List Files of Type

Select the type of file you want to open.

Analyzer Setup	Lists all the files

(*.set)	saved with the .SET extension.
Result Data	Lists all the files
(*.dat)	saved with the .DAT extension.
Limit Line	Lists all the files
(*.lim)	saved with the .LIM extension.

Note: *See Jump to default directories below.*

Drives

Select the drive on which FS-K4 will store the file that you want to save.

Directories

Select the directory in which FS-K4 will store the file you want to save.

Jump to default directories

Enables automatic setting of the default drive and path each time you change to a different file type using the List Files of Type box.

Print Preview command (File Menu)

Use this command to display the print preview window, with which you can see how a report will look when you print it. FS-K4 displays each page in a reduced size. You can customize the report for the current unit under test, see Preview Setup *(p33)* dialogue box for more information.

To preview a report before printing

1. From the File menu, choose Print Preview (ALT, F, V).
2. FS-K4 displays the first page of the report.
3. To customize the report for the current unit under test, choose the Setup (ALT, S) button.
4. To view different pages in the report, use the Previous (ALT, P) and Next (ALT, N) buttons.
5. To print the report use the Print (ALT, R) button.
6. After viewing the report in print preview, you can close the print preview window by choosing the Close (ALT, C) button or pressing the ESCAPE key.

Preview Setup command (File Menu)

Use this dialogue to customize the report text and configuration for the current Unit Under Test.

Dialogue Box Options

Heading, ..., Comment 2

Type report text as required.

Titles

Includes the above text fields in the report. If the result data has been stored to a disk file, the file name and description will also be included.

Setup

Includes the Sweep Setup information in the report.

Date

Includes the time and date at which the last measurement was made in the report.

Markers

Includes the Normal and Delta Markers, if they are turned on in the main display.

Print command (File Menu)

Use this command to print reports. To specify a printer and its connection, use the Print Setup *(p34)* command in the File menu. Alternatively you can use the Printer Setup command in the Options menu of Print Manager. See your Windows documentation for more information.

Print Setup command (File menu)

Use this command to select a printer and connection, and specify printer settings. The settings you select become the default settings.

Dialogue Box Options

Printer

Select the printer you want to use.

Default Printer	Uses the current default system printer.
Specific Printer	Uses a printer selected from the list of installed devices.

Note: *You install printers and configure ports through the Windows Control Panel. For information on installing printers, see your system documentation.*

Orientation

Select the page orientation, Portrait or Landscape, that you want for printing.
With Portrait, the page is taller than it is wide when you view the printed document upright (the document prints lengthways on the page). With Landscape, the page is wider than it is tall when you view the printed document upright (the document prints sidewise on the page).

Paper

Select the size and source of paper you want to use.

Size	Open the list and then select the size of paper you want to use.
Source	Open the list, and then select the paper source you want to use.

Options

Choose this button to display the Options dialogue box, which contains additional options specific to the printer you select in the Printer box.
For more information, open the Options dialogue and select the Help command button.

Exit command (File Menu)

Use this command to end your FS-K4 session. You can also use the Close command on the application Control menu. FS-K4 prompts you to save files with unsaved changes.

Shortcuts

Mouse: Double-click the application Control-menu button.

Keys: ALT+F4

Edit Menu

The Edit menu comprises the commands used for defining the analyzer setup parameters (sweep parameters) and the limit lines. The purpose of these settings is outlined in section „Creating an Analyzer Setup“ on page 23.

Sweep Setup command (Edit Menu)

Use this command to modify Analyzer Setup parameters.

Note: *Changes that affect the validity of displayed results will cause the measurement buffers to be cleared. In this case a warning message will be displayed when the OK button is chosen.*

Dialogue Box Options

Analyzer

Model

Select the type of Analyzer that this setup will be used with. This determines the range of frequencies that are available.

FSE-B2

Select this box if the setup will be used with an Analyzer equipped with the FSE-B2 7GHz Frequency Extension option. This box is only enabled for the following Analyzer models: FSEA 20, FSEA 30 and FSIQ 3.

FSE-B4

Select this box if the setup will be used with an Analyzer equipped with the FSE-B4 Low Phase Noise and OCXO option. This box is only enabled for the following Analyzer models: FSEA 20, FSEB 20, FSEM 20, and FSEK 20.

FSE-B5

Select this box if the setup will be used with an Analyzer equipped with the FSE-B5 FFT Bandwidths option. This box is only enabled for the following Analyzer models: FSEA 20, FSEB 20, FSEM 20, and FSEK 20.

Signal

Frequency

Enter the frequency of the carrier whose phase noise you wish to measure.
Specify the unit by appending GHz, kHz, MHz or GHz. In each case, the first letter is sufficient in either upper or lower case.

Level

Magnitude of carrier in dBm.

Verify Frequency

Enables a search, across a frequency tolerance range, for the carrier of greatest magnitude. Resultant carrier frequency and level are measured. If the level is within a level tolerance range, the measured values override the specified Signal Frequency and Level. Otherwise the measurement is aborted.
This should be used when carrier frequency is not known precisely and when a very small Minimum Offset is used.

Frequency Tolerance

Range, either side of Signal Frequency, within which the carrier is known to be. Specify unit as for Frequency.

Level Tolerance

Offset relative to Signal Level above which the carrier is know to be.

Display

X-Axis

Minimum Offset

Select the offset at which to start the sweep.

Maximum Offset

Select the offset at which to finish the sweep.

Y-Axis

Maximum Level

Enter the value you want at the upper extent of the Graph's level axis. Phase Noise levels are normalized to the carrier level and expressed in dBc/Hz.

Level Range

Enter the range of values you want for the Graph's level axis in dB.

Tools

Trace Offset

Enter any fixed offset in dB. This value will be added to each measured value.

Smoothing Window

The trace may be smoothed by calculating the linear average of sample values in a sliding window. Enter the width of the window as a number of samples.
The width must be a positive, odd, integer, less than 200, i.e. $0 < n < 200$, n mod 2 = 1. The default value of 1 turns smoothing off.
The smoothing algorithm used is as follows:

$$y'(s) = 10 * Log_{10}\left(\left| \sum_{x=s-\left(\frac{n-1}{2}\right)}^{x=s+\left(\frac{n-1}{2}\right)} 10^{\left| \frac{y(x)}{10} \right|} \right| \div n \right)$$

Where: s = the trace sample number, $y(s)$ = the phase noise at sample s, x = the sample offset from s, and n = the width of the sliding window. When x exceeds the boundary samples, the boundary sample is used, i.e. if the trace has samples numbering 0 to 500 then with n = 5 and s = 0 the average is calculated as:

$$y'(0) = 10 * Log_{10}\left(\left| 3 * 10^{\left| \frac{y(0)}{10} \right|} + 10^{\left| \frac{y(1)}{10} \right|} + 10^{\left| \frac{y(2)}{10} \right|} \right| \div 5 \right)$$

Report

Opens the Report Setup *(p37)* dialogue box.

Advanced

Opens the Advanced Sweep Setup *(p37)* dialogue box.

Report Setup

Use this dialogue to define those parts of the report text which are independent of the Unit Under Test and to select the default report configuration.

Dialogue Box Options

Heading, ..., Comment 2

Type report text as required.

Titles

Includes the above text fields in the report. If the result data has been stored to a disk file, the file name and description will also be included.

Setup

Includes the Sweep Setup information in the report.

Date

Includes the time and date at which the last measurement was made in the report.

Markers

Includes the Normal and Delta Markers, if they are turned on in the main display.

Advanced Sweep Setup

FS-K4 measures each decade of offset from the carrier in a separate sweep. Some decades are further split into sub-bands to allow optimum use of resolution filter and main PLL bandwidths. Use this dialogue to modify the Resolution Filter Bandwidths for each sub-band. In addition you can set the number of averaging sweeps made for each sub-band, and for analyzers equipped with FFT filters you can choose between FFT or normal filters for each sub-band.

Dialogue Box Options

Settings

See Using Table Entry Boxes *(p61)* for detailed information about using this control.

From

This column lists the start frequency of each sub-band

To

This column lists the stop frequency of each sub-band

Resolution BW

This column lists the Resolution Filter Bandwidth used for each sub-band. Enter values between 1 Hz and 3 MHz in steps of 1, 2, 3 and 5. You can specify the unit by appending GHz, kHz, MHz or GHz. In each case, the first letter is sufficient in either upper or lower case.

Note: *FSP accepts values between 10Hz and 10MHz using analogue filters, and between 1Hz and 30kHz using FFT filters, in steps of 1 and 3.*

Sweep Count

This column lists the number of sweeps to average over for each sub-band. Values must be integer, greater than zero, and odd. Default is 1.

Use FFT Filter

This column only appears when FS-K4 detects an analyzer supporting FFT filters, or when there is no analyzer attached to your PC. It allows you to choose whether to use the FFT Resolution Filter or the conventional filter for each decade.
When you enable FFT Filters for the decades starting at 10 Hz and 100 Hz, the entire decade is measured in one sweep. Accordingly the three sub bands used with normal filters are replaced with a single sub band. The Resolution Filter Bandwidth used is fixed for each sub-band, and cannot be modified.

Default

Select this button to return all settings to the following default values:

FSEx 20

From	To	Resolution BW	Sweep Count	Use FFT Filter
10 Hz	20 Hz	2 Hz	1	Off
20 Hz	40 Hz	5 Hz	1	Off
40 Hz	100 Hz	10 Hz	1	Off
100 Hz	200 Hz	20 Hz	1	Off
200 Hz	400 Hz	50 Hz	1	Off
400 Hz	1 kHz	100 Hz	1	Off
1 kHz	10 kHz	200 Hz	1	Off
10 kHz	30 kHz	500 Hz	1	Off
30 kHz	100 kHz	3 kHz	1	Off
100 kHz	1 MHz	3 kHz	1	Off
1 MHz	10 MHz	30 kHz	1	not available
10 MHz	100 MHz	300 kHz	1	not available
100 MHz	1 GHz	3 MHz	1	not available
1 GHz	10 GHz	3 MHz	1	not available

FSP x

From	To	Resolution BW	Sweep Count	Use FFT Filter
10Hz	30Hz	1Hz	1	On
30Hz	100Hz	10Hz	1	On
100Hz	300Hz	10Hz	1	On
300Hz	1kHz	100Hz	1	On
1kHz	3kHz	100Hz	1	On
3kHz	10kHz	300Hz	1	On
10kHz	30kHz	300Hz	1	On
30kHz	100kHz	3kHz	1	Off
100kHz	300kHz	10kHz	1	Off
300kHz	1MHz	30kHz	1	Off
1MHz	10MHz	30kHz	1	Off
10MHz	100MHz	300kHz	1	not available
100MHz	1GHz	3MHz	1	not available
1GHz	10GHz	10MHz	1	not available

FSEx 30, FSIQ x, ESI x

From	To	Resolution BW	Sweep Count	Use FFT Filter
10 Hz	20 Hz	2 Hz	1	Off
20 Hz	40 Hz	5 Hz	1	Off
40 Hz	100 Hz	10 Hz	1	Off
100 Hz	200 Hz	20 Hz	1	Off
200 Hz	400 Hz	50 Hz	1	Off
400 Hz	1 kHz	100 Hz	1	Off
1 kHz	10 kHz	200 Hz	1	Off
10 kHz	60 kHz	500 Hz	1	Off
60 kHz	100 kHz	500 Hz	1	Off
100 kHz	200 kHz	3 kHz	1	Off
200 kHz	1 MHz	3 kHz	1	Off
1 MHz	10 MHz	30 kHz	1	not available
10 MHz	100 MHz	300 kHz	1	not available
100 MHz	1 GHz	3 MHz	1	not available
1 GHz	10 GHz	3 MHz	1	not available

RBW/VBW Ratio

Select the ratio of Resolution Filter Bandwidth to Video Filter bandwidth. The default value is 10-to-1, but you can also select 1-to-1, or 1-to-10 in special circumstances.

Limit Line command (Edit Menu)

Use this command to create and modify and activate Limit Line files.

Dialogue Box Options

Name

Type a name for the limit line.
This name will be used to identify the limit line when plotted on the Graph and when it is stored on disk or downloaded to a Analyzer. It may be up to eight characters long and can use any combination of the following: A..Z a..z 0..9 and _.

Values

Use this box to enter the limit line definition. This box has two columns for sample frequency and level respectively. Frequencies must be entered in order of magnitude with the lowest value at the top of the list. You can specify the unit by appending Hz, kHz, MHz or GHz. In each case, the first letter is sufficient in either upper or lower case. Limit values are assumed to be in dBc/ Hz, so it is not necessary to specify a unit.
You must enter at least two samples in ascending order of frequency with the lowest frequency at the top of the table. The total number of samples entered is shown by the Samples field. If you enter an illegal or out-of-range value, a message will be displayed in the Status Bar *(p54)* showing the range of acceptable values

See Using Table Entry Boxes *(p61)* for more information.

Activate/Deactivate

Changes the status of the limit line to active or not active. When active the limit line will appear on the Graph panel.

Shift Level
: Opens the Shift Level *(p40)* dialogue box.

Insert
: Inserts a new row in the Values box at the highlighted position.

Delete
: Removes the highlighted row in the Values box.

Samples
: Displays the number of samples that have been defined.

Maximum
: Displays the maximum number of samples that can be defined. This value is always 50.

Shift Level

Use this dialogue to alter the level of all samples in the limit line by an amount that you specify.

Dialogue Box Options

Level Offset
: Type the offset value you want to use.

View Menu

The View menu comprises the commands used for customizing the screen by displaying or hiding various information panels, traces and measurement results.

Graph command (View Menu)

This command only appears when a check mark appears next to the Measurement Log *(p47)* command in the Options menu.
Use this command to display or hide the Graph and Markers panels.
A check mark appears next to the command name when the Graph is displayed.
For more information, see Graph *(p55)*.

Log command (View Menu)

This command only appears when a check mark appears next to the Measurement Log *(p47)* command in the Options menu.
Use this command to display or hide the Log panel, which lists information about the progress of each measurement as well as reporting key values used or measured.
A check mark appears next to the command name when the Log is displayed.
For more information, see Log *(p56)*.

Uncorrected command (View Menu)

This command is only enabled when the reference trace buffer is not empty. A measurement trace may be copied into the reference buffer using the Trace to Reference *(p44)* command in the Sweep menu.
Use this command to display the Uncorrected trace on the Graph panel. A check mark appears next to the command name when the Uncorrected trace is displayed. This command also hides the Corrected trace.
When this command is checked the Uncorrected trace will also appear in the Report Diagram.

Reference command (View Menu)

This command is only enabled when the reference trace buffer is not empty. A measurement trace may be copied into the reference buffer using the Trace to Reference *(p44)* command in the Sweep menu.
Use this command to display or hide the Reference trace on the Graph panel. A check mark appears next to the command name when the Reference trace is displayed.
When this command is checked the reference trace will also appear in the Report Diagram.

Corrected command (View Menu)

This command is only enabled when the reference trace buffer is not empty. A measurement trace may be copied into the reference buffer using the Trace to Reference *(p44)* command in the Sweep menu.
Use this command to display the Corrected trace on the Graph panel. A check mark appears next to the command name when the Corrected trace is displayed. This command also hides the Uncorrected trace.
When this command is checked the Corrected trace will also appear in the Report Diagram.

Residual PM command (View Menu)

Use this command to display or hide the calculated Residual Phase Modulation on the Graph panel. A check mark appears next to the command name when the Residual PM is displayed.
In Normal Marker mode, or with no markers displayed, Residual Phase Modulation is calculated using all measured values from the Minimum Offset to the Maximum Offset inclusive. In Delta Marker mode, the calculation is based on the measured samples that lie between the two markers, and is updated each time the frequency of either marker changes.
When this command is checked the Residual PM value will also appear in the Report Diagram.

Residual FM command (View Menu)

Use this command to display or hide the calculated Residual Frequency Modulation on the Graph panel. A check mark appears next to the command name when the Residual FM is displayed.
In Normal Marker mode, or with no markers displayed, Residual Frequency Modulation is calculated using all measured values from the Minimum Offset to the Maximum Offset inclusive. In Delta Marker mode, the calculation is based on the measured samples that lie between the two markers, and is updated each time the frequency of either marker changes.
When this command is checked the Residual FM value will also appear in the Report Diagram.

Sweep Menu

The Sweep menu comprises the commands used for starting and terminating a measurement and for storing and deleting the reference trace.

Start command (Sweep Menu)

Use this command to begin a new Sweep measurement using the current Analyzer Setup file.

Note: *Any displayed Sweep results will be cleared by this command.*

FS-K4 starts by configuring the analyzer according to the current Analyzer Setup. If for any reason the Analyzer does not respond, an error message will be displayed describing the problem. See Communication Problems *(p65)* for more information.
If the Verify Frequency and Level function is selected in the Sweep Setup *(p35)* dialogue box, FS-K4 will then check to see if there is a Signal within the specified Frequency and Level Tolerance ranges relative to the specified Signal Frequency and Level. If no Signal is found, or a Signal is found, which is outside the tolerance range, an information dialogue will be displayed describing the problem, and the measurement will be aborted.
As soon as the Sweep starts, "Sweep running... (0%)" will appear in the Status Bar. The percentage indicator will increase each time a new block of data is displayed and is calculated as the ratio of values received to total values expected.
The overall sweep is divided into a number of sub-bands, which are measured separately. This is optimized to provide the best combination of measurement accuracy and speed. If the RF Overload warning is activated whilst measuring a sub-band, the input attenuation will be increased by 10dB and the sub-band will be re-measured. If the sweep cannot be completed for any reason, an information dialogue will be displayed describing the problem and the measurement will be aborted.
Once the Sweep is finish, "Sweep complete" appears in the Status Bar.

Stop command (Sweep Menu)

Use this command to terminate a Sweep measurement.
"Sweep aborted" will appear in the Status bar *(p54)*, an information dialogue will be displayed confirming the action, and FS-K4 will stop the Sweep.

Mode command (Sweep Menu)

Use this command to switch repetitive Sweeping on and off and also to choose between Graph *(p55)* display modes Clear/Write and Max. Hold.
A sub-menu appears when this command is selected with the following options:

Clear/Write

Use this command to disable repetitive Sweeping and select Clear/Write display mode.
The Sweep will then end at the stop frequency of the Sweep.
A check mark appears next to the command name when this mode is selected.

Repeat Clear/Write

Use this command to enable repetitive Sweeping in the Clear/Write display mode.
The Sweep will then automatically re-start each time the Analyzer reaches the stop frequency of the Sweep. In Clear/Write mode, the Graph panel displays only those values measured during the current pass.
A check mark appears next to the command name when this mode is selected.

Repeat Max. Hold

Use this command to enable repetitive Sweeping in the Max. Hold display mode.

The Sweep will then automatically re-start each time the Analyzer reaches the stop frequency of the Sweep. In Max. Hold mode, the Graph displays the maximum value measured at each frequency during all passes since the Repeat Max. Hold command was used.

A check mark appears next to the command name when this mode is selected.

Trace to Reference command (Sweep Menu)

Use this command to copy the main Sweep trace into the Reference Trace Buffer.
You can then make a new measurement or load an existing Result Data file and compare the traces in the following ways:

- use the Reference *(p41)* command in the View menu to display the reference with the main trace then,
- use the Graph *(p55)* panel to compare them visually or
- use the Markers *(p56)* to compare them point by point or
- use the Corrected *(p41)* command in the View menu to display the calculated difference between the main and reference traces.

Note: *Both traces must be measured using the same Analyzer setup. The reference trace will be cleared as soon as an incompatible setup is loaded.*

Reference trace data may be stored along with other measurement results by using the Save *(p32)* command with the File of Type box set to Result Data.

Clear Reference command (Sweep Menu)

Use this command to clear the contents of the Reference Trace Buffer.

Marker Menu

The Marker menu comprises the commands used for handling the marker functions and for magnifying a selected portion of the measured spectrum.

Normal command (Marker Menu)

Use this command to display or hide the Normal marker and the Markers box, which shows the current frequency and level co-ordinates of the Graph marker(s).
A check mark appears next to the command name when the Normal marker and Marker box are displayed.
For more information, see Markers *(p56)* and Moving the marker *(p60)*.

Delta command (Marker Menu)

Use this command to switch between normal and delta marker modes.
In delta mode, the Delta marker will initially appear superimposed on the Normal marker. All keyboard and mouse methods for marker positioning will apply to the Delta marker, whilst the Normal marker will remain fixed in position, see Moving the marker *(p60)* for details.
A check mark appears next to the command when the delta marker mode is selected.
For more information, see Markers *(p56)*.

Next Marker command (Marker Menu)

This command is only enabled when the delta marker is active.
Use this command to toggle control of marker frequency between the Normal and Delta markers.

Measure at Marker command (Marker Menu))

Use this command to measure phase noise using the analyzer's Phase Noise Marker at the current marker frequency.
If the marker frequency is not between the analyzer's current start and stop frequencies, the sub-band containing it will be swept first using the current Analyzer Setup parameters.
This command provides a convenient method for checking Phase Noise at spot frequencies.

Note: *This command is disabled whilst a Sweep measurement is running.*

Zoom In command (Marker Menu))

Use this command to magnify a selected portion of the measured spectrum displayed by the Graph *(p55)*.
This may be used when more values have been measured than can be represented on the horizontal axis due to insufficient display resolution. The frequency axis of the Graph is expanded and all traces and the limit lines are redrawn. The level axis is not affected.
You can use the Zoom In command repeatedly until all detail is visible at which point the command is disabled.
The frequency range covered by the zoom function depends on the marker mode:

Normal (p45)	The frequency axis is expanded to show 10% of the display width centered on the current marker frequency. In the vicinity of the start and stop frequencies the software performs an adaptation.
Delta (p45)	The frequency axis is expanded to show the band between the normal and delta markers

Zoom Out command (Marker Menu)

Use this command to undo the last Zoom In *(p45)* command.

The new display will be centered on the Normal Marker frequency. In the vicinity of the start and stop frequencies the software performs an adaptation.
You can use the Zoom Out command repeatedly until all Zoom commands have been undone and the complete measurement spectrum is displayed. If you want to undo the all Zoom commands in one go, choose the Original Diagram *(p46)* command.

Note: *This command is only available when the Delta* (p45) *marker is disabled.*

Original Diagram command (Marker Menu)

Use this command to undo all Zoom commands and display the complete measurement spectrum.
This command is automatically performed whenever the Start *(p43)* command is used to make a new Sweep measurement.
If you want to undo the last Zoom In command, choose the Zoom Out *(p46)* command.

Options Menu

The Options menu offers various settings specifying the Measurement Log function, the components of the display, the default paths for data files and the analyzer. All settings made in this menu can be saved to disk..

Measurement Log command (Options Menu)

Use this command to enable or disable the Measurement Log function.
A check mark appears next to the command name when the Log is enabled.
For more information, see Log *(p56)*.

Display command (Options Menu)

Use this command to modify the color, style and width of various components that form the Sweep Graph display.

Dialogue Box Options

Feature

Select the component you want to change.

Note: *Text style and width default to solid and 1 respectively, and cannot be modified.*

Color

Select a new color for the component you select in the Feature box.

Style

Select a new style for the component you select in the Feature box.

Note: *For line widths greater than 1, the style defaults to solid and cannot be modified.*

Width

Select a new width for the component you select in the Feature box.

Sample

This box displays a line drawn using the current color, style and width settings.

Default

Select this button to return all color, style and width settings to the following default values:

Feature	Color	Style	Width
Border	Black	Solid	1
Vertical Grid Major	Grey	Solid	1
Vertical Grid Minor	Grey	Dot	1
Horizontal Grid	Grey	Dot	1
Text	Black	Solid	1
Trace	Blue	Solid	1
Ref. Trace	Cyan	Solid	1
Limit	Light Red	Dash	1
Normal Marker	Light Red	Solid	1
Delta Marker	Light Magenta	Solid	1

Default Paths command (Options Menu)

Use this command to modify the default locations of each type of data file used by FS-K4.

Dialogue Box Options

Default directory

This field displays the current default directory for the data type you select in the Files of Type box.

Files of Type

Select the type of file whose default directory you want to modify.

Analyzer Setup	Analyzer Setup files.
Result Data	Result Data files.
Limit Line	Limit Line files.

Directories

Select the default directory in which FS-K4 will store the data type you select in the Files of Type box. The default directory will not actually change until the Set command button is selected.

Note: *To select a directory, double click on the directory name until the open folder icon is shown.*

Drives

Select the default drive on which FS-K4 will store the data type you select in the Files of Type box. The default directory will not actually change until the Set command button is selected.

Set

Select this button to copy the current drive and directory settings to the Default directory field.

Analyzer command (Options Menu)

Use this command to modify the default Analyzer type, address and start-up conditions.

Note: *At startup, FS-K4 will check to see if the analyzer it was last used with is present. If not, it checks to see if it is running on the analyzer itself. It this fails, it checks each GPIB address.*

- If no analyzer is found, FS-K4 assumes that you will connect an analyzer later, and selects the analyzer type used most recently as the default.
- If FS-K4 is running on the analyzer, it selects the internal, DDE communications method, which bypasses the GPIB, and sets this analyzer and communications method as the new default.
- Finally, if an analyzer is found at a GPIB address, it is selected as the new default.

This command allows you to override these settings when an analyzer is connected to the bus after startup.

Dialogue Box Options

Use DDE

When FS-K4 is run on the analyzer, this enables control of the analyzer without using the GPIB.

Use GPIB

When FS-K4 is not run on the analyzer, this enables control of the analyzer using the GPIB.

Address

Select the bus address of the Analyzer you want to work with. If the analyzer is connected and turned on when you start FS-K4, this value will be set automatically.

Initialize on start-up

Enables initialization of the Analyzer each time FS-K4 is started. This is equivalent to pressing the PRESET key on the front panel of the Analyzer.

Save Options command (Options Menu)

Use this command to save all Options Menu settings to disk.
Each setting is written to the FS-K4.INI file, which resides in your Windows directory. Each time you restart FS-K4, these settings will be used.

Note: *To make temporary changes, simply use the Options Menu commands to alter the settings as required, but do not use the Save Options command. Next time you start FS-K4 the temporary settings will be replaced with your normal settings.*

Help Menu

The Help Menu offers commands used for starting the FS-K4 on-line Help and obtaining information on the installed software and on product support services.

Contents command (Help Menu)

Use this command to display the opening screen of Help. From the opening screen, you can jump to various types of reference information.
Once you open Help, you can click the first button on the left in the help window whenever you want to return to the opening screen.

Search for Help on command (Help Menu)

Displays Help's Search dialogue so you can quickly find the information you need.

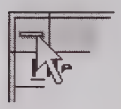
Obtaining Technical Support command

Gives details on product support services for FS-K4 available to you from Rohde & Schwarz.

About FS-K4 command (Help Menu)

Use this command to display the version number of your copy of FS-K4 for Windows, the copyright notice, Windows mode, available memory, and installed math co-processors.

Control Menu



The Control menu is located at the left end of the title bar in an application window. It comprises the commands used for modifying or closing the active application window and for switching to another application.

To display commands that control the size and position of an application window, click the application Control-menu box or press ALT+SPACEBAR.

Restore command (Control menu)

Use this command to return the active window to its size and position before you chose the Maximize or Minimize command.

Clicking in the upper-right corner of a maximized window is the same as choosing the Restore command.

Shortcuts

Mouse: Double-click the title bar.

Move command (Control menu)

Use this command to display a four-headed arrow so you can move the active window or dialogue box with the arrow keys.

Note: *This command is unavailable if you maximize the window.*

Size command (Control menu)

Use this command to display a four-headed arrow so you can move the active window or dialogue box with the arrow keys.

Note: *This command is unavailable if you maximize the window.*

Minimize command (Control menu)

Use this command to reduce the FS-K4 window to an icon.

Clicking in the upper-right corner of the window is the same as choosing the Minimize command.

Maximize command (Control menu)

Use this command to enlarge the FS-K4 window to fill the entire screen.

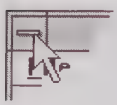
Clicking in the upper-right corner of the window is the same as choosing the Maximize command.

Shortcuts

Mouse: Double-click the title bar

Close command (Control menu)

Use this command to close the FS-K4 window.
Double-clicking a Control-menu box is the same as choosing the Close command.



Shortcuts

Keys: ALT+F4 closes the FS-K4 window

Switch To command (Control menu)

Use this command to display a list of all open applications. Use this "Task List" to switch to or close an application on the list.

Shortcut

Keys: CTRL+ESC

Dialogue Box Options

Task List

Select the application you want to switch to or close.

Switch To

Makes the selected application active.

End Task

Closes the selected application.

Cancel

Closes the Task List box.

Cascade

Arranges open applications so they overlap and you can see each title bar.

Note: *This option does not affect applications reduced to icons.*

Tile

Arranges open applications into windows that do not overlap.

Note: *This option does not affect applications reduced to icons.*

Arrange Icons

Arranges the icons of all minimized applications across the bottom of the screen.

4 Parts of the FS-K4 Screen

The Application Window for FS-K4 is divided into the workspace where all measured data is displayed and manipulated, and various control elements and information areas.

FS-K4 Control menu

Located at the left end of the title bar in an application window.
To display commands that control the size and position of an application window, click the application Control-menu box or press ALT+SPACEBAR.

For more information, see section „Control Menu“ on page 51.

Maximize button

Located at the right end of the title bar when the application is not maximized.
When you click the maximize button, the application window enlarges to fill the screen.

Note: *Maximized windows have no borders.*

Menu bar

Located below the title bar, along the top of the application window, this area contains a list of FS-K4 commands.
To view all the commands in a menu, do one of the following:
Click the menu name.
Press ALT+*n*, where *n* is the underlined letter in the menu name. For example, press ALT+F to open the File menu.

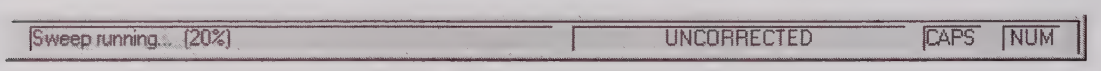
Minimize button

Located at the right end of the title bar when the application is not minimized.
Clicking the Minimize button is the same as choosing Minimize from the application Control menu: The application window shrinks to an icon.

Restore button

Located at the right end of the title bar when the application window is minimized or maximized.
Clicking the Restore button is the same as choosing Restore from the application Control menu: The application window returns to its previous size.

Status Bar



This is the area across the bottom of the application window below the workspace.
It contains four fields:

Message Field

During long operations this field displays a short message describing the current activity. In certain cases this includes a counter showing the percentage of the task completed so far.

Trace Indicator

Shows the descriptions of the active traces.

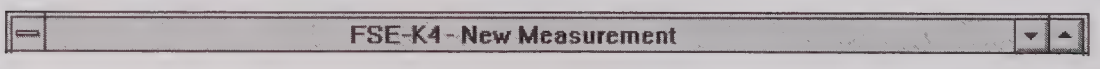
Caps Lock Indicator

Shows the current status of the Caps Lock key on the keyboard. When the key is active CAPS appears, otherwise the field is empty.

Num Lock Indicator

Shows the current status of the Num Lock key on the keyboard. When the key is active NUM appears, otherwise the field is empty.

Title Bar



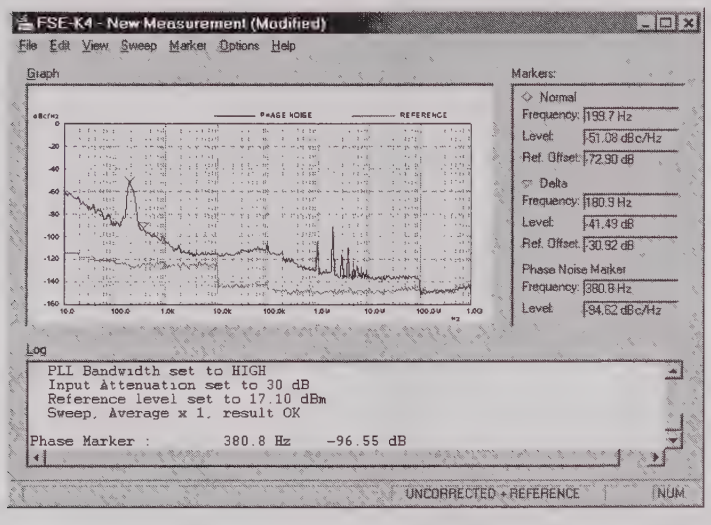
This is the area across the top of the application window between the system menu icon and the minimize, maximize and restore buttons. It displays the application name "FS-K4" and the name of the current file. FS-K4 deals with several different file types of varying degrees of importance. The title bar always displays the name of the most important data type currently in use. If the file has been altered in any way since it was loaded this will be indicated by the word **(modified)** appearing to the right of the file name.

The data types are as follows:

Data Type	File Extension	Importance
Limit Line	*.lim	Least
Analyzer Setup	*.set	
Result Data	*.dat	Most

At start-up the default setup for the current default Analyzer is automatically loaded. This has the name "New Setup".

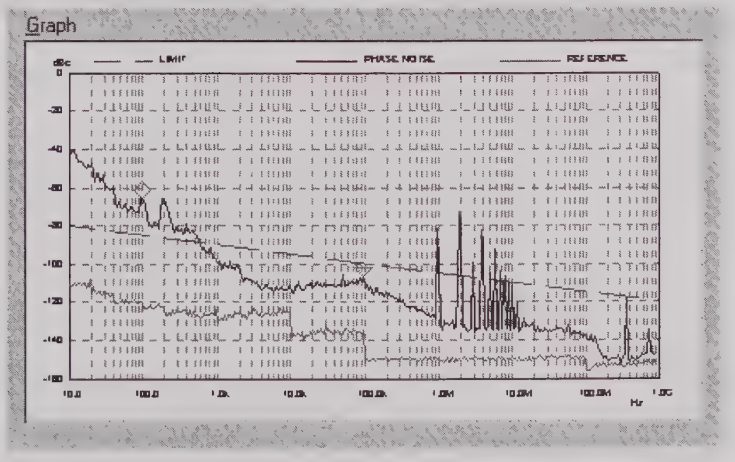
Workspace



This is the area below the menu bar in which all measured data is displayed and manipulated. It contains three areas as follows:

1. Graph *(p55)* area showing the sweep trace as a 2-dimensional graph,
2. Log *(p56)* area displaying information on the last measurement,
3. Markers *(p56)* area showing the current co-ordinates of the active markers.

Graph

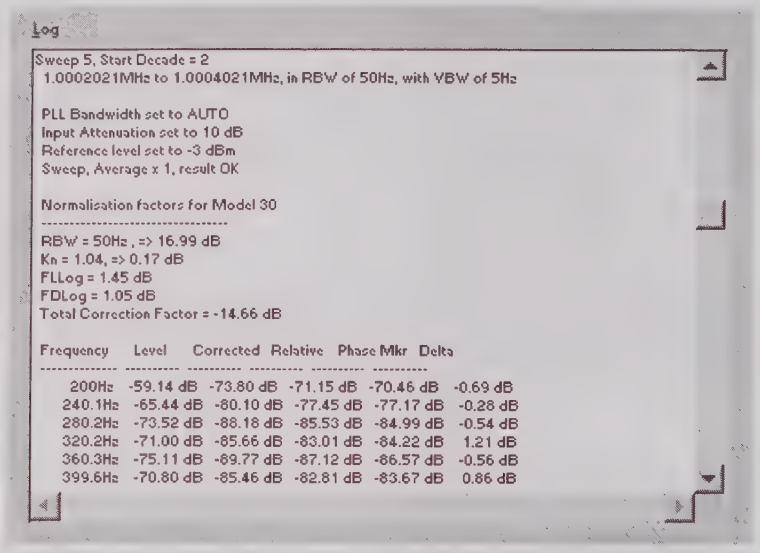


Displayed in the top left of the workspace area, below the menu bar.
Shows sweep trace data in graphical form with, optional limit line, and calculated values of Residual PM and Residual FM. The minimum and maximum values of each axis reflect the frequency offset and level ranges defined in the current Analyzer Setup.

A Markers area *(p56)* may also be displayed, which allows the precise frequency offset and phase noise of each data point to be read from the screen.
To hide or display the Graph, choose Graph from the View menu (ALT, V, G).

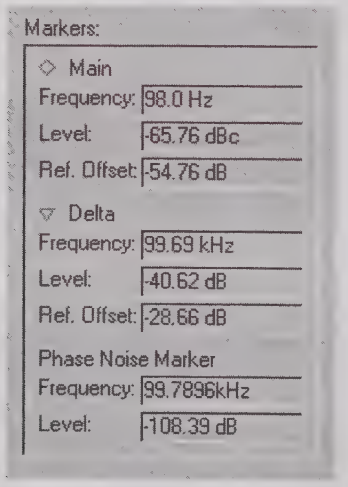
Hint: *The Graph region scales with the application window and always fills the available space within the workspace area. In order to see the most detail, maximize the application and then use the View and Marker menu commands to hide the Log and Normal Marker.*

Log


Log
Sweep 5, Start Decade = 2
1.0002021MHz to 1.0004021MHz, in RBW of 50Hz, with VBW of 5Hz
PLL Bandwidth set to AUTO
Input Attenuation set to 10 dB
Reference level set to -3 dBm
Sweep, Average x 1, result OK
Normalisation factors for Model 30
RBW = 50Hz , => 16.99 dB
Kn = 1.04, => 0.17 dB
FLLog = 1.45 dB
FDLog = 1.05 dB
Total Correction Factor = -14.66 dB
Frequency Level Corrected Relative Phase Mkr Delta
200Hz -59.14 dB -73.80 dB -71.15 dB -70.46 dB -0.69 dB
240.1Hz -65.44 dB -80.10 dB -77.45 dB -77.17 dB -0.28 dB
280.2Hz -73.52 dB -88.18 dB -85.53 dB -84.99 dB -0.54 dB
320.2Hz -71.00 dB -85.66 dB -83.01 dB -84.22 dB 1.21 dB
360.3Hz -75.11 dB -89.77 dB -87.12 dB -86.57 dB -0.56 dB
399.6Hz -70.80 dB -85.46 dB -82.81 dB -83.67 dB 0.86 dB

Displayed at the bottom of the workspace area, above the status bar.
Displays detailed progress and result information for the most recent sweep measurement and any subsequent Measure at Marker operations.
The logging function is only enabled when a tick appears next to the Measurement Log command in the Options menu (ALT, O, L).
When logging is enabled use the Log command in the View menu (ALT, V, L) to hide or display the Log region.
Log information for a sweep measurement is automatically saved and loaded with the Result Data (*.DAT) file. It is stored in a text file (*.TXT) with the same filename as the Result Data file, i.e. if you save Result Data to "MYDATA.DAT" the log information will be saved to "MYDATA.TXT".
See Log Text Files *(p72)* for a description of the Log file content.

Markers



Displayed in the top right of the workspace area, below the menu bar.
Shows the current co-ordinates of the Graph marker(s) and the analyzer's Phase Noise Marker.
To hide or display the Marker region, choose Normal from the Marker menu (ALT, M, N).

Note: *If the Graph is hidden using the Graph command in the View menu, the Marker region is hidden also.*

Normal ◇

This group of fields are always displayed when the Normal marker is enabled.

Frequency

Shows the frequency offset relative to the carrier at the current position.

Level

Shows the absolute phase noise level at the current position

Ref. Offset

This field only appears when the Reference *(p41)* trace is displayed. It shows the difference between the main and reference traces at the current position.

Delta ▽

This group of fields are only displayed when the Delta marker is enabled.

Frequency

Shows the frequency offset relative to the Normal marker at the current position.

Level

Shows the phase noise level offset relative to the Normal marker at the current position

Ref. Offset

This field only appears when the Reference *(p41)* trace is displayed. It shows the difference between the main and reference traces at the current position.

Phase Noise Marker

This group of fields only appears when the Measure at Marker command is used.

Frequency

Shows the frequency offset relative to the carrier at the current Phase Noise Marker position

Level

Shows the absolute phase noise level reported by the Phase Noise Marker at the current Phase Noise Marker position.

5 Keyboard and Mouse

The following chapter gives an overview of the keyboard and mouse functions which can be used for entering characters and numbers, editing text, handling markers and for various other tasks.

Deleting and inserting text

FS-K4 has numerous shortcut keys you can use to delete or insert text.

Deleting text

To	Press
Delete one character to the left of the insertion point or selected text	BACKSPACE
Delete one character to the right of the insertion point or selected text	DEL
Delete selected text and send it to the Clipboard	CTRL + X or SHIFT + DEL
Reverse the last action (also known as "undo")	CTRL + Z

Inserting text

To	Press
Copy text to the Clipboard	CTRL + C or CTRL + INS
Insert Clipboard contents	CTRL + V or SHIFT + INS

Function keys

You can use the function keys on your keyboard to perform many tasks faster.

F1

To	Press
Get help on the selected command, open dialogue box, or a message	F1

F3

To choose	Press
Sweep Setup *(p35)* from the Edit Menu	F3

F5

To choose	Press
Start *(p43)* from the Sweep Menu	F5

F8

To choose	Press
Stop *(p43)* from the Sweep Menu	F8

F10

To choose	Press
Make the menu bar active	F10

F11

To choose	Press
New *(p31)* from the File Menu	F11

F12

To choose	Press
Save As *(p32)* from the File Menu	F12
Open *(p31)* from the File Menu	CTRL + F12
Save *(p32)* from the File Menu	SHIFT + F12
Print *(p34)* from the File Menu	CTRL + SHIFT + F12

Moving the insertion point in a text entry field

To move the insertion point through a text field:

- Click the new location.

- Do one of the following.

To move	Press
One character to the left	←
One character to the right	→
One word to the left	CTRL + ←
One word to the right	CTRL + →
To the end of a line	END
To the beginning of a line	HOME

Moving the marker

- Position the mouse pointer over the Graph *(p55)* at the desired frequency and click the left mouse pointer. The marker will move to the selected frequency.

1. Press ALT + G to move focus to the Graph.
2. Use the ↑ and ↓ keys for coarse positioning of the marker.
3. Use the ← and → keys to move the marker to the desired frequency.

Re-measuring at the Marker

- Do one of the following.

1. Position the mouse pointer over the Graph *(p55)* at the desired frequency.
2. Double-click the left mouse button. If the selected frequency is outside the current analyzer settings, the sub-band containing the frequency will be re-measured. The Analyzer will then position its Phase Noise Marker at the selected frequency and the measured phase noise will be reported in the Markers panel.

Alternatively

1. Position the mouse pointer over the Graph at the desired frequency and click the left mouse button. The marker will move to the selected frequency.
2. Choose the Measure at Marker *(p45)* command from the Marker menu.

1. Press ALT + G to move focus to the Graph.
2. Use the ← and → keys to move the marker to the desired frequency. See Moving the marker *(p60)* for more information.
3. Choose the Measure at Marker *(p45)* command (ALT, M, M) from the Marker menu.

Selecting in a text entry field

- Do one of the following:

To select	Do this
Any text	Drag across the text you want to select. You can also select any text by placing the insertion point at one end of the text you want to select, then holding down the SHIFT key, and then clicking the opposite end of the text.
A word	Double-click the word.

- Do one of the following:

To extend selection	Press
One character to the left	SHIFT + ←
One character to the right	SHIFT + →
One word to the left	CTRL + SHIFT + ←
One word to the right	CTRL + SHIFT + →
To the end of a line	SHIFT + END
To the beginning of a line	SHIFT + HOME

Using Table Entry Boxes

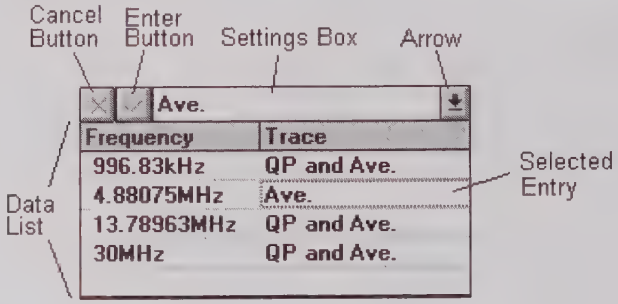
Description

A Table Entry box consists of:

The Settings box

Located at the top of the Table Entry box, this is where you make a change to the selected entry. Simply enter the new value by typing it in the Settings box. Click the Enter button

{bmc ticksel.bmp} to accept the change, or click the Cancel button {bmc crosssel.bmp} to cancel the change.



The Data list

Located at the bottom of the Table Entry box, this list shows the data that you enter into the table and allows you to select an entry to modify.

Table Entry Box Keys

Use these key combinations when the Data list has the focus:

Press	To
Shift+Tab	Switch focus to the command buttons.
Page Down	Move down through the Data list.
Page Up	Move up through the Data list.
↓	Move down through each entry.
↑	Move up through each entry.
→	Move right and down through each entry.
←	Move left and up through each entry.
End	Move to the right hand column.
Home	Move to the left hand column.
Alpha	Move the insertion point to the Settings box and enter a new value.
Tab	Move the insertion point to the Settings box.

For on/off entries simply double click over the entry to switch between the two values.
Use these key combinations when the Settings box has the focus:

Press	To
Ctrl+Z	Undo the last editing action in the current line.
Ctrl+C	Copy the selected text to the Clipboard.
Ctrl+X	Cut the selected text to the Clipboard.
Del	Delete the selected text without placing it on the Clipboard.
Ctrl+V	Paste the Clipboard contents at the insertion point.
Enter	Move the insertion point into the Data list and commit the entry change.
Shift+Tab	Switch focus to the Data list without committing the entry change.
Tab	Move the focus to the Data list and commit the entry change.
Esc	Move the focus to the Data list and cancel the entry change.

6 Command Line Options

You can use the following switches to change the way FS-K4 behaves when you start the application.

Switch	Argument	Description
/FR	[*drive*][*path*]*filename*	Load the specified result data file (*.dat). If you do not specify a drive or path, FS-K4 will look in the default Result Data directory specified in the Options Default Paths dialogue box. For example /FRD:\RESULTS\MYDATA.DAT
/FS	[*drive*][*path*]*filename*	Load the specified Analyzer setup file (*.set) For example /FSD:\STANDARD\EN55022.SET
/LI	none	Enables listing of all GPIB operations to a file in the FS-K4 directory called GPIB.DOC. This is intended for problem solving and should not be used on a regular basis since it reduces system performance.
/SL	none	Forces FS-K4 to use monochrome bit maps for the tick and cross buttons in Table Entry boxes. This can make these buttons more readable on some display adapters.

The following switches temporarily override the corresponding settings in the Options Analyzer dialogue box.

Switch	Argument	Description
/R	FSEA 20(+B2)(+B4)(+B5) | FSEA 30(+B2) | FSEB 20(+B4)(+B5) | FSEB 30 | FSEM 20(+B4)(+B5) | FSEM 30 | FSEK 20(+B4)(+B5) | FSEK 30 | FSIQ 3(+B2) | FSIQ 7 | FSIQ 26 | FSIQ 40 | ESI 7 | ESI 26 | ESI 40 | FSP 3 | FSP 7 | FSP 13 | FSP 30	Specify a different default Analyzer type. For example /RFSEM 30 Note: the text in parentheses is optional and should only be included if the Analyzer is fitted with the corresponding option.
/ID	none	Disable *Initialize on Start-up* function

7 Communication Problems

If the application fails to communicate with the Analyzer, a message box is displayed describing the problem. The following possibilities exist:

Problem	Suggested Action
The computer is not fitted with an GPIB card.	Choose the Cancel button to ignore the problem. The application continues normally but you can only use commands that do not involve the Analyzer.
The interface card is not configured correctly.	Use the configuration software supplied with the interface card to set all parameters to their default condition and then choose Retry. Alternatively choose Cancel to ignore the problem and then re-configure the card at a later time and before attempting to use any Analyzer functions. FS-K4 is designed to work with the default settings as supplied with the card.
The Analyzer is not connected to the interface card.	Connect the Analyzer and choose Retry. Alternatively choose Cancel to ignore the problem and then connect the Analyzer before attempting to use any Analyzer functions.
The Analyzer is not switched on.	Turn the Analyzer on, wait for it to initialize, and then choose Retry. Alternatively choose Cancel to ignore the problem and then turn on the Analyzer before attempting to use any Analyzer functions.
The Analyzer bus address does not match that specified in the Options Analyzer dialogue box.	Change the Analyzer address to match that set in the Options Analyzer dialogue box and then choose Retry. Alternatively choose Cancel to ignore the problem and then modify the address in the Options Analyzer dialogue box before attempting to use any Analyzer functions.

8 Data Storage Format

With the exception of Log Text Files, FS-K4 stores all setup and result data in the form of ASCII tab delimited files.
The first line of each file is the long description that you enter in the right hand side of the File Description box in the Save As dialogue box. The remainder consists of EntryValue pairs representing run-time options for the application. Related entries are grouped together in Sections, which start with a section name in square brackets [], and finish with [END].

There are five different types of data file as follows:

Limit Line Files *(p67)*	Contains a Limit Line definition
Analyzer Setup Files *(p68)*	Contains definitions for a Sweep Setup and an optional Limit Line
Result Data Files *(p70)*	Complete list of measured values, definitions for the Sweep Setup used to make the measurement, and an optional Limit Line.
Log Text Files *(p72)*	Complete text of the measurement log generated during a measurement.
FS-K4.INI *(p74)*	Configuration settings

Conventions Used in Descriptions of Data Storage Format

This section uses the following typographic conventions

keywords	In syntax, normal letters indicate information you must type as shown.
description	In syntax, letters with serifs indicate descriptive information, which you should NOT include.
variable	In syntax, italic letters can indicate placeholders for information you supply.
{ON | OFF}	In syntax, braces and a vertical bar indicate a choice between two or more items. You must choose one of the items unless all of the items also are enclosed in angle brackets.
(option)	In syntax, parentheses indicate optional items. For example 'FSEA 20(+B2)(+B4)(+B5)' means the text string 'FSEA 20' plus any combination of the text strings '+B2', '+B4', and '+B5' including none of them.
TAB	The tab character, ASCII 9.

Limit Line Files

These contain the following groups and entries

Line	[Group] or Entry	Value
1		*Long description, which you enter in the right hand side of File Description box in the Save As dialogue box*
2	[VERSION]	
3	VERSION	*Software version used to write the file, enclosed in single quotes*
4	[END]	
5	[LIMIT]	

Line	[Group] or Entry	Value
6	MAX	*Value of limit parameter in peak vertex*
7	NAME	*Identifier entered in Name box of Limit Line dialogue box, enclosed in single quotes*
8	BANK	0
9	LENGTH	*Number of vertices*
10	VERTEX	0 TAB *Frequency of first vertex* TAB *Limit value of first vertex*
11	VERTEX	1 TAB *Frequency of second vertex* TAB *Limit value of second vertex*
⋮	⋮	⋮
10+(n-1)	VERTEX	*n-1* TAB *Frequency of last vertex* TAB *Limit value of last vertex*. Where n = the number of vertices.
10+n	[END]	

Analyzer Setup Files

These contain the following groups and entries

Line	[Group] or Entry	Value
1		*Long description, which you enter in the right hand side of File Description box in the Save As dialogue box*
2	[VERSION]	
3	VERSION	*Software version used to write the file, enclosed in single quotes*
4	[END]	
5	[RX SETUP]	
6	RX TYPE	{ 'FSEA 20(+B2)(+B4)(+B5)' | 'FSEA 30'(+B2)' | 'FSEB 20(+B4)(+B5)' | 'FSEB 30' | 'FSEM 20(+B4)(+B5)' | 'FSEM 30' | 'FSEK 20(+B4)(+B5)' | 'FSEK 30' | 'FSIQ 3(+B2)' | 'FSIQ 7' | 'FSIQ 26' | 'FSIQ 40' | 'ESI 7' | 'ESI 26' | 'ESI 40' | 'FSP 3' | 'FSP 7' | 'FSP 13' | 'FSP 30' }
7	GRID START FREQ	*Graph x-axis start frequency in hertz*
8	GRID STOP FREQ	*Graph x-axis stop frequency in hertz*
9	GRID MINLEVEL	*Graph y-axis minimum in dBc/ Hz*
10	GRID MAXLEVEL	*Graph y-axis maximum in dBc/ Hz*
11	SWEEP CENTER FREQ	*Signal frequency in hertz*
12	SWEEP FREQ TOLERANCE	*Signal tolerance frequency in hertz*
13	SWEEP LEVEL TOLERANCE	*Signal tolerance level in dB*
14	SWEEP MIN FREQ OFFSET	*Minimum offset frequency to be measured in hertz*
15	SWEEP MAX FREQ OFFSET	*Maximum offset frequency to be measured in hertz*
16	SWEEP DISPLAY REF	0
17	SWEEP REF LEVEL	*Graph y-axis maximum in dBc/ Hz*
18	SWEEP LEVEL RANGE	*Graph y-axis range in dB*
19	SWEEP LEVEL OFFSET	*Offset value to be added to all measured values in dB*
20	SWEEP COUPLING RATIO	{ 10 | 1 | 0.1 } where 10 means 'RBW = 10 x VBW', 1 means 'RBW = VBW', and 0.1 means '10 x RBW = VBW'
21	SWEEP SMOOTHING WINDOW	*Smoothing window width in number-of-samples*

Line	[Group] or Entry	Value
22	SWEEP VERIFY CENTER	{ 1 | 0 } where 1 means *"Verify Signal Frequency and Level"*, and 0 means *"Do not Verify Signal Frequency and Level"*
23	REPORT HEADING	*User report text, enclosed in single quotes*
24	REPORT MEASUREMENT TYPE	*User report text, enclosed in single quotes*
25	REPORT EUT NAME	*User report text, enclosed in single quotes*
26	REPORT MANUFACTURER	*User report text, enclosed in single quotes*
27	REPORT CONDITIONS	*User report text, enclosed in single quotes*
28	REPORT OPERATOR	*User report text, enclosed in single quotes*
29	REPORT TEST SPEC	*User report text, enclosed in single quotes*
30	REPORT COMMENT 1	*User report text, enclosed in single quotes*
31	REPORT COMMENT 2	*User report text, enclosed in single quotes*
32	REPORT TITLES	{ 1 | 0 } where 1 means 'Include user report text', and 0 means 'Exclude user report text'
33	REPORT DATE	{ 1 | 0 } where 1 means 'Include measurement complete date', and 0 means 'Exclude measurement complete date'
34	REPORT SWEEP	{ 1 | 0 } where 1 means 'Include setup information', and 0 means 'Exclude setup information'
35	LIMIT UPPER NAME	*Identifier entered in Name box of Limit Line dialogue box, enclosed in single quotes*
36	LIMIT UPPER DESCRIPTION	*Long description, of limit line file, which you enter in the right hand side of File Description box in the Save As dialogue box, enclosed in single quotes*
37	LIMIT UPPER BANK	0
38	SUBBAND RBW	1 1 *RBW for decade 1, sub-band 1*
39	SUBBAND RBW	1 2 *RBW for decade 1, sub-band 2*
40	SUBBAND RBW	1 3 *RBW for decade 1, sub-band 3*
41	SUBBAND RBW	2 1 *RBW for decade 2, sub-band 1*
42	SUBBAND RBW	2 2 *RBW for decade 2, sub-band 2*
43	SUBBAND RBW	2 3 *RBW for decade 2, sub-band 3*
44	SUBBAND RBW	3 1 *RBW for decade 3, sub-band 1*
45	SUBBAND RBW	4 1 *RBW for decade 4, sub-band 1*
46	SUBBAND RBW	4 2 *RBW for decade 4, sub-band 2*
47	SUBBAND RBW	5 1 *RBW for decade 5, sub-band 1*
48	SUBBAND RBW	6 1 *RBW for decade 6, sub-band 1*
49	SUBBAND RBW	7 1 *RBW for decade 7, sub-band 1*
50	SUBBAND RBW	8 1 *RBW for decade 8, sub-band 1*
51	SUBBAND RBW	9 1 *RBW for decade 9, sub-band 1*
52	SUBBAND SWEEPS	1 1 *Sweep count for dec. 1, sub-band 1*
53	SUBBAND SWEEPS	1 2 *Sweep count for dec. 1, sub-band 2*
54	SUBBAND SWEEPS	1 3 *Sweep count for dec. 1, sub-band 3*
55	SUBBAND SWEEPS	2 1 *Sweep count for dec. 2, sub-band 1*
56	SUBBAND SWEEPS	2 2 *Sweep count for dec. 2, sub-band 2*
57	SUBBAND SWEEPS	2 3 *Sweep count for dec. 2, sub-band 3*
58	SUBBAND SWEEPS	3 1 *Sweep count for dec. 3, sub-band 1*

Line	[Group] or Entry	Value		
59	SUBBAND SWEEPS	4	1	*Sweep count for dec. 4, sub-band 1*
60	SUBBAND SWEEPS	4	2	*Sweep count for dec. 4, sub-band 2*
61	SUBBAND SWEEPS	5	1	*Sweep count for dec. 5, sub-band 1*
62	SUBBAND SWEEPS	6	1	*Sweep count for dec. 6, sub-band 1*
63	SUBBAND SWEEPS	7	1	*Sweep count for dec. 7, sub-band 1*
64	SUBBAND SWEEPS	8	1	*Sweep count for dec. 8, sub-band 1*
65	SUBBAND SWEEPS	9	1	*Sweep count for dec. 9, sub-band 1*
66	SUBBAND FFT	1	1	{ 0 | 1 } where 0 means 'do not use FFT filter', and 1 means 'do use FFT filter' for decade 1, sub-band 1
67	SUBBAND FFT	1	2	{ 0 | 1 } for decade 1, sub-band 2
68	SUBBAND FFT	1	3	{ 0 | 1 } for decade 1, sub-band 3
69	SUBBAND FFT	2	1	{ 0 | 1 } for decade 2, sub-band 1
70	SUBBAND FFT	2	2	{ 0 | 1 } for decade 2, sub-band 2
71	SUBBAND FFT	2	3	{ 0 | 1 } for decade 2, sub-band 3
72	SUBBAND FFT	3	1	{ 0 | 1 } for decade 3, sub-band 1
73	SUBBAND FFT	4	1	{ 0 | 1 } for decade 4, sub-band 1
74	SUBBAND FFT	4	2	{ 0 | 1 } for decade 4, sub-band 2
75	SUBBAND FFT	5	1	{ 0 | 1 } for decade 5, sub-band 1
76	SUBBAND FFT	6	1	{ 0 | 1 } for decade 6, sub-band 1
77	SUBBAND FFT	7	1	{ 0 | 1 } for decade 7, sub-band 1
78	SUBBAND FFT	8	1	{ 0 | 1 } for decade 8, sub-band 1
79	SUBBAND FFT	9	1	{ 0 | 1 } for decade 9, sub-band 1
80	[END]			
81	[LIMIT] Same as [LIMIT] section in Limit Line Files *(p67)*.			
86+ n	[END]			

Result Data Files

These contain the following groups and entries:

Line	[Group] or Entry	Value
1		*Long description, which you enter in the right hand side of File Description box in the Save As dialogue box*
2	[VERSION]	
3	VERSION	*Software version used to write the file, enclosed in single quotes*
4	[END]	
5	[REPORT]	
6	VIEW MODE	*Bitmap value indicating display mode of Graph* where bit 0 = Uncorrected trace, bit 1 = Corrected trace, bit 2 = Reference trace, bit 3 = Residual PM, bit 4 = Residual FM. If the bit is set, the feature will be displayed.

Line	[Group] or Entry	Value
7	MARKER MODE	*Bitmap value indicating marker display mode* where bit 0 = Delta Marker, bit 1 = Normal Marker. If the bit is set, the Marker will be displayed
8	MARKER NORMAL	*Frequency of Normal Marker in hertz.*
9	MARKER DELTA	*Frequency of Delta Marker in hertz.*
10	DATE STAMP	*Date and time at which measurement was completed, enclosed in single quotes*
11	SETUP NAME	*File name, of analyzer setup file, which you enter in the left hand side of File Description box in the Save As dialogue box, enclosed in single quotes*
12	SETUP DESCRIPTION	*Long description, of analyzer setup file, which you enter in the right hand side of File Description box in the Save As dialogue box, enclosed in single quotes*
13	[END]	
14	[RX SETUP] Same as [RX SETUP] section Analyzer Setup Files *(p68)*.	
89	[END]	
90	[LIMIT] Same as [LIMIT] section in Limit Line Files *(p67)*.	
95+n	[END]	
96	[SWEEP DATA]	
97	START	*Minimum offset frequency measured in hertz*
98	STOP	*Maximum offset frequency measured in hertz*
99	TOTAL	*Number of measurement points expected.* This is calculated as: 1 + 499 x the number of sub-bands measured
100	MAX	*Number of measurement points that will be saved.* If TOTAL > 30000 then this value is 30000, otherwise it is equal to TOTAL.
101	NEXT	*Index that will be used for the next measurement point received - 1.* If the measurement was completed this value will be equal to MAX.
102	LAST	*Index that was used for the last measurement point received.* If the measurement was completed this value will be equal to MAX.
103	FACTOR	*Conversion factor from expected measurement point number to saved point index.* If TOTAL is equal to MAX this will be -1, otherwise it will be: -1 x (MAX/TOTAL)
104	LOGSCALE	0
105	SIGNAL FREQUENCY	Signal frequency measured by the *Verify Signal Frequency and Level* function in hertz.
106	SIGNAL LEVEL	Signal level measured by the *Verify Signal Frequency and Level* function in dBm.
107	VERTEX	0 TAB *Frequency of first vertex* TAB *Level value of first vertex* TAB 0 TAB 1
108	VERTEX	1 TAB *Frequency of second vertex* TAB *Level value of second vertex* TAB 0 TAB 1
⋮	⋮	⋮
107+(n-1)	VERTEX	1 TAB *Frequency of last vertex* TAB *Level value of last vertex* TAB 0 TAB 1. Where n = the number of saved points
107+n	[END]	
107+(n+1)	[SWEEP DATA]	Same layout as preceding [SWEEP DATA] section. This section will only exist if the result data file includes a reference trace.

Line	[Group] or Entry	Value
		When this section is included, the preceding [SWEEP DATA] section contains the reference trace data, and this section contains the uncorrected trace data. The corrected trace is not stored since it can be calculated from the uncorrected and reference traces. When this section is not included, the preceding section contains the uncorrected trace data.
209+(2 x n)	[END]	

Log Text Files

Each time a new sweep measurement is started, the log is cleared. FS-K4 then tries to initialize the analyzer and will log the result, for example:

```
Initialization
==============

Analyzer type FSEB 30+B2+B4+B5 initialized successfully.
```

If the Carrier Search function is enabled, its results will appear next. The analyzer sweeps a span of twice the Frequency Tolerance, centered on the Signal Frequency specified in the Sweep Setup dialogue. If the peak exceeds the reference level, the reference level is increased by 10dB and the sweep repeated. The peak is then accurately measured using the frequency counter and marker. For example:

```
Carrier search starting
=======================

  Center 100 MHz, Span 2 kHz
  RBW 2 kHz, Reference level -15.00 dBm
  Sweep, Max Hold x 1, result OK
  Peak found at 50.0000661 MHz, 2.94 dBm

  Sweep, ClearWrite x 1, result OK

Carrier found at 149.9999939 MHz, 2.94 dBm
```

If no Signal is found or if the Signal is outside the specified tolerances, the measurement will be aborted. The Reference Level and any Level Offset to be used during the Phase Noise sweep are then logged, for example:

```
Ref. Level will be set to 2.94 dBm for offsets less than 10 kHz.
Ref. Level will be set to -17.06 dBm for offsets greater than 10 kHz

Level Offset is 0.00 dB
```

Input attenuation is normally calculated to obtain a signal level of up to +5dBm at the mixer input for offsets greater than 10 kHz. However since the frequency response of the front end is not guaranteed to be flat, it is necessary to check whether any additional attenuation will be required for offsets from 10 kHz to 100 MHz. Above this, the carrier is well outside the edges of the resolution bandwidth filter and not additional attenuation is required.

A check is made to see if the RF Overload warning is activated with the calculated input attenuation. If it is activated, the attenuation is increased in 10dB steps until the overload is removed.

```
RF Overload Check starting
==========================

  Input Attenuation set to 0 dB
  Sweep, Average x 1, result *** RF Over Range ***
  Input Attenuation set to 10 dB
```

```
  Sweep, Average x 1, result OK

Attenuation will be offset by 10 dB, in the range 10 kHz to 100 MHz
```

The Phase Noise measurement then starts. The overall sweep is divided into one or more sub-sweeps depending on the specified start and stop offsets. For each sub-sweep the following information is logged:

Start Decade Number	Sub-sweep within decade
Absolute Start Frequency	Absolute Stop Frequency
Resolution Bandwidth	Video Bandwidth
Main PLL Bandwidth	Input Attenuation
Reference level	Normalization Factors

In addition the analyzer's Phase Noise Marker is used to measure at six points equally spaced across the sub-band and the results are listed along with the results from the sub-band and the computed difference. For example:

```
Sweep 1, Start Decade = 3, Sub-band = 1

  Offsets 1kHz to 10kHz relative to 149.9999939MHz
  RBW set to 200Hz
  PLL Bandwidth set to HIGH, FFT Filter is ON
  Input Attenuation set to 20 dB
  Reference level set to 2.90 dBm
  Sweep, Average x 1, result OK

  Normalization factors for Model 7
  ---------------------------------
  RBW = 200Hz , => 23.01 dB
  Kn = 1.06, => 0.25 dB
  FLLog = 1.45 dB
  FDLog = 1.05 dB
  Total Correction Factor = -20.76 dB

  Frequency   Level       Corrected   Relative    Phase Mkr   Delta
  ----------  ----------  ----------  ----------  ----------  ----------
        1kHz   -80.89 dB  -101.65 dB  -104.59 dB  -105.79 dB    1.20 dB
   2.8036kHz   -92.96 dB  -113.72 dB  -116.66 dB  -115.43 dB   -1.23 dB
   4.6072kHz   -86.93 dB  -107.69 dB  -110.63 dB  -115.99 dB    5.36 dB
   6.4108kHz   -92.96 dB  -113.72 dB  -116.66 dB  -116.23 dB   -0.43 dB
   8.2144kHz   -92.96 dB  -113.72 dB  -116.66 dB  -116.59 dB   -0.07 dB
       10kHz   -86.93 dB  -107.69 dB  -110.63 dB  -111.10 dB    0.47 dB
```

Once the sweep is complete the following message is logged:

```
Phase Noise measurement complete
================================
```

FS-K4.INI

These contain the following groups and entries

Line	[Group] or Entry	Value
1	[VERSION]	
2	VERSION	*Software version used to write the file, enclosed in single quotes*
3	[END]	
4	[SETUP]	
5	ANALYZER	{ 'FSEA 20(+B2)(+B4)(+B5)' | 'FSEA 30(+B2)' | 'FSEB 20(+B4)(+B5)' | 'FSEB 30' | 'FSEM 20(+B4)(+B5)' | 'FSEM 30' | 'FSEK 20(+B4)(+B5)' | 'FSEK 30' | 'FSIQ 3(+B2)' | 'FSIQ 7' | 'FSIQ 26' | 'FSIQ 40' | 'ESI 7' | 'ESI 26' | 'ESI 40' | 'FSP 3' | 'FSP 7' | 'FSP 13' | 'FSP 30' }
6	METHOD	{ 0 | 1 } where 0 means 'use GPIB', and 1 means 'use DDE'
7	INITIALIZE	{ 0 | 1 } where 0 means 'do not initialize on start-up', and 1 means 'do initialize on start-up'.
8	ADDRESS	{ 0 | 1 | ... | 31 }
9	DEFAULT PATH	0 *Fully qualified path for Analyzer Setup files*
10	DEFAULT PATH	1 *Fully qualified path for Result Data files*
11	DEFAULT PATH	2 *Fully qualified path for Limit Line files*
12	GRAPHIC FORMAT	0 *Bitmap value indicating color, style, and line width used to draw Graph border*
		Where bits 0 to 3 specify the color, bits 4 to 7 specify the Style, and bits 8 to 11 specify the line width.
13	GRAPHIC FORMAT	1 *Bitmap value indicating color, style, and line width used to draw Graph Vertical Grid*
14	GRAPHIC FORMAT	2 *Bitmap value indicating color, style, and line width used to draw Graph Horizontal Grid*
15	GRAPHIC FORMAT	3 *Bitmap value indicating color, style, and line width used to draw Graph Text*
16	GRAPHIC FORMAT	4 *Bitmap value indicating color, style, and line width used to draw Graph Trace*
17	GRAPHIC FORMAT	5 *Bitmap value indicating color, style, and line width used to draw Graph Ref. Trace*
18	GRAPHIC FORMAT	6 *Bitmap value indicating color, style, and line width used to draw Graph Limit*
19	GRAPHIC FORMAT	7 *Bitmap value indicating color, style, and line width used to draw Graph Normal Marker*
20	GRAPHIC FORMAT	8 *Bitmap value indicating color, style, and line width used to draw Graph Delta Marker*
21	DDE GRAPH	0
22	DDE SETUP	0
23	DDE TEXT	0
24	DDE START	0
25	DDE STOP	0
26	HELPFILE	*Name of help file*

Line	[Group] or Entry	Value
27	TMO NORMAL	{ 0 | 1 | ... | 17 } Sets the normal GPIB timeout period. Default value is 12. 0 means disabled - no timeout 1 10 µs 2 30 µs 3 100 µs 4 300 µs 5 1 ms 6 3 ms 7 10 ms 8 30 ms 9 100 ms 10 300 ms 11 1 s 12 3 s 13 10 s 14 30 s 15 100 s 16 300 s 17 1000 s
28	TMO SPOLL	{ 0 | 1 | ... | 17 } Sets the GPIB timeout period used during serial poll operations. Default value is 13
29	TMO DISPLAY	{ 0 | 1 | ... | 17 } Sets the GPIB timeout period used during display update operations. Default value is 13
30	TMO INIT	{ 0 | 1 | ... | 17 } Sets the GPIB timeout period used during initialization operations. Default value is 12
31	LOG SWEEP	{ 0 | -1 } where 0 means 'disable Measurement Log', and -1 means 'enable measurement log'
32	[END]	

9 Decision and Error Messages

The following table contains an alphabetical list of all decision and error messages that can be issued by FS-K4. An explanation, possible options and/or steps for error elimination are given for each message.

Message	Explanation ➢ Error elimination
Analyzer failed identification test at GPIB address (number)	FS-K4 tried to identify the Analyzer type using the specified GPIB address, but there was no response. Either there is another device using the same address, or the Analyzer has the wrong bus address, or it is not connected to the GPIB, or it is not turned on. **To fix the problem and try again** ➢ Check that the Analyzer is switched on, connected to the GPIB, and set to the specified bus address. Also verify that there are no other devices using the same address. Then choose the Retry button. **To abort the Analyzer operation** ➢ Choose the Cancel button.
Analyzer frequency range exceeded	The frequency range of the specified files exceeds the capabilities of the specified Analyzer. It will not be possible to make a sweep measurement. **To correct this problem do one of the following:** ➢ Modify the frequency range of the specified files before making a measurement. ➢ Use a different Analyzer.
Analyzer not found at GPIB address (number)	FS-K4 tried to control the Analyzer using the specified GPIB address, but there was no response. Either the Analyzer has the wrong bus address, or it is not connected to the GPIB, or it is not turned on. **To fix the problem and try again** ➢ Check that the Analyzer is switched on, connected to the GPIB, and set to the specified bus address. Then choose the Retry button. **To abort the Analyzer operation** ➢ Choose the Cancel button.
Analyzer not responding	FS-K4 tried to control the Analyzer but there was no response. Either the Analyzer is not connected to the GPIB, or it is not turned on. **To fix the problem and try again** ➢ Check that the Analyzer is switched on, and connected to the GPIB. Then choose the Retry button. **To abort the Analyzer operation** ➢ ▸ Choose the Cancel button.
Analyzer type at GPIB address (number) is not supported	FS-K4 found an unsupported device type at the specified GPIB address. **To fix the problem and try again** ➢ Choose the OK button to abort this Analyzer operation. Replace the Analyzer with one of the following: FSEA 20(+B2)(+B4)(+B5) | FSEA 30(+B2) | FSEB 20(+B4)(+B5) | FSEB 30 | FSEM 20(+B4)(+B5) | FSEM 30 | FSEK 20(+B4)(+B5) | FSEK 30 | FSIQ 3(+B2) | FSIQ 7 | FSIQ 26 | FSIQ 40 | ESI 7 | ESI 26 | ESI 40 | FSP 3 | FSP 7 | FSP 13 | FSP 30, where the text in parentheses is optional and should only be included if the corresponding option is fitted to your Analyzer. Then try again.
Analyzer type does not match setup	FS-K4 found that the active Analyzer is of a different type to that specified in the Sweep Setup *(p35)*. **To correct this error do one of the following:** ➢ Change the Sweep Setup to select the correct Analyzer type. ➢ Change the Analyzer to match that specified in the Sweep Setup.

Message	Explanation ➢ Error elimination
Changes to Analyzer setup will invalidate results	One or more of the changes you have made affect the way in which the Sweep measurement is made. Thus the measured data currently stored in memory has become invalid and will be erased. **To continue with the new settings and erase existing results** ➢ Choose the OK button. **To undo the changes and retain the existing results** 1. Choose the Cancel button. 2. Exit the editor by choosing the Cancel button.
DDE Link driver software missing	FS-K4 was unable to find the driver software for the DDE Link. The driver files are called RSIB.DLL and RSDDE.DLL, and should have been installed in your C:\WINDOWS\SYSTEM directory, or equivalent. **To correct this error** ➢ Copy the files from the C:\RSIB directory on the FSE hard disk to the C:\WINDOWS\SYSTEM directory. Then re-start Windows and FS-K4. ➢ If the C:\RSIB directory is missing, contact your Rohde & Schwarz representative and ask for a firmware upgrade. Once this has been installed, re-install the FS-K4 software, by following the instructions on the disk label, and re-start FS-K4.
ERROR	An error condition has occurred. Please make a note of the error message and your actions leading up to it's appearance and report them to Rohde & Schwarz Services Ltd. **To continue** ➢ Choose the OK button to continue the application.
File already exists	While saving a file, you typed the name of an existing file. **To replace the existing file with the active file** ➢ Choose the Yes button. **To retain the existing file** 1. Choose the No button. 2. Type a different name for the active file.
File does not exist	You tried to open a file that does not exist. **To correct this error do one of the following:** ➢ Make sure you typed the correct path and filename. ➢ Type the name of a file that exists. ➢ If a list is available, select a filename.
Filename does not follow DOS conventions	The name of a file or directory can have two parts: a name and an optional extension. The two parts are separated by a period. For example, MYFILE.SET is a valid filename; MYFILE is the name of a file, and .SET is the filename extension. The name can contain up to eight characters, and the extension can contain up to three characters. The name must start with either a letter or number. It can contain any uppercase or lowercase characters except the following: Period(.) Quotation Mark (") Slash (/) Backslash (\) Brackets ([ ]) Colon (:) Semicolon (;) Vertical Bar (|) Equal Sign (=) Comma (,) If you use these characters in a filename, you may get unexpected results. The name cannot contain any spaces. The following names are reserved and cannot be used for files or directories: CON, AUX, COM1, COM2, COM3, COM4, LPT1, LPT2, LPT3, PRN, and NUL.
GPIB address not specified	There is no GPIB address defined for the specified Analyzer type so FS-K4 is unable to establish

Message	Explanation ➢ Error elimination
	communication. **To correct this error** ➢ Assign a valid bus address to the specified Analyzer type using the Analyzer *(p48)* command in the Options menu, then re-try. complete.
GPIB card missing	FS-K4 was unable to find a GPIB card installed in this computer and will not be able to control an Analyzer. **To correct this error** 1. Install and configure a supported interface card. 2. Re-run FS-K4.
GPIB driver did not recognize the name	FS-K4 was unable to communicate with the GPIB. **To correct this error** 1. Run the configuration software supplied with the interface card and set all parameters to their default condition. 2. Choose Retry to try again. **To continue without GPIB capability** ➢ Choose Cancel.
GPIB driver software missing or out-of-date	FS-K4 was unable to find the driver software for your GPIB, or the driver does not support the required functionality. The driver file is called GPIB.DLL and should have been installed in your C:\WINDOWS\SYSTEM directory, or equivalent. **To correct this error** ➢ If the driver is missing: re-install it, from the disks supplied with your GPIB card, according to the manufacturers instructions. Then re-start Windows and FS-K4. ➢ If the driver is out-of-date: contact your GPIB card supplier and ask for the latest release of driver software for your card and operating system. Then install it according to the manufacturers instructions, and re-start Windows and FS-K4.
Incorrect entries	You specified one or more values that are outside the capabilities of the specified Analyzer type. **To fix the problem and try again** ➢ Correct the specified parameters. ➢ Choose the OK command button. **Note:** *Refer to the documentation supplied with your Analyzer for more information concerning the range of values that may be entered.*
Limit definition error	A limit line definition must contain a name, and at least two samples. **To fix the problem and try again** 1. Correct the specified parameters. 2. Choose the OK command button.
MEASUREMENT ABORTED - Analyzer firmware does not support FFT Filter control via GPIB	You enabled FFT Filters for one or more sub-bands, however the version of firmware installed on your analyzer does not support the control of FFT Filters via the GPIB. Please contact your Rohde & Schwarz representative and ask for a firmware upgrade. Once this has been installed, FS-K4 will allowing these settings to be used.
MEASUREMENT ABORTED - Carrier Frequency is outside Signal Frequency Tolerance range	FS-K4 has found a Signal Carrier which is either lower than the Signal Frequency - Frequency Tolerance, or greater than the Signal Frequency + Frequency Tolerance. **To fix this problem do one of the following** ➢ Increase the Frequency Tolerance range in the Sweep Setup box. ➢ Modify the Signal Frequency setting in the Sweep Setup box. ➢ Adjust the signal generator to produce the desired output frequency.

Message	Explanation ➢ Error elimination
MEASUREMENT ABORTED - Max. Peak Level is outside Signal Level Tolerance range	FS-K4 has found a Signal Carrier which is lower than the Signal Level - Level Tolerance. **To fix this problem do one of the following** ➢ Increase the Level Tolerance range in the Sweep Setup box. ➢ Modify the Signal Level setting in the Sweep Setup box. ➢ Adjust the signal generator to produce the desired output level.
MEASUREMENT ABORTED - No Signals found within Signal Frequency Tolerance range	FS-K4 was unable to find any Signal Carrier. **To fix this problem and try again** 1. Check that the signal generator is producing an output at the correct frequency and level. 2. Check that the signal generator is connected to the Analyzer's RF INPUT. 3. Check that the correct Signal Frequency and Level have been specified in the Sweep Setup box. 4. Choose Start from the Sweep menu, to start a new measurement.
MEASUREMENT ABORTED - Operator command	This message simply confirms that FS-K4 has responded to the Sweep menu's Stop command.
MEASUREMENT ABORTED - Sweep did not complete within expected time period	The sweep took longer than expected or did not start correctly. This is usually caused by a firmware problem within the Analyzer. **To fix this problem and try again** 1. Turn the analyzer off, and then back on. 2. Wait until the analyzer has initialized, and then try making the measurement again.
MEASUREMENT ABORTED - Sweep range exceeds analyzer maximum stop frequency	The Signal Frequency + Maximum Offset is greater than the maximum frequency that can be measured by the Analyzer. **To fix this problem and try again** 1. Reduce the Maximum Offset in the Sweep Setup box. 2. Choose Start from the Sweep menu, to start a new measurement.
Possible incorrect entries	You specified one or more values that may be outside the capabilities of the specified Analyzer type. Some Analyzers are supplied with an extended frequency range. However it is not possible to determine the upper frequency limit from the model number or installed options. **To try measuring with the programmed values** 1. Choose the OK command button. 2. Try making a measurement by choosing Start from the Sweep menu. If the programmed values exceed the Analyzer's frequency range, the measurement will be aborted. **To modify the programmed values and try again** 1. Choose the Cancel command button in this message box. 2. Correct the specified parameters. 3. Choose the OK command button in the Sweep Setup box. **Note:** *Refer to the documentation supplied with your Analyzer for more information concerning the range of values that may be entered.*
Printer not selected	The Print Setup dialogue was unable to initialize the selected printer. Some drivers such as the HP Plotter cannot be selected from FS-K4. **To correct this error** ➢ Use the Printer Setup command in Print Manager's Options menu to select and configure the required printer driver before printing from FS-K4.

Message	Explanation ➢ Error elimination
Reference trace is not compatible with new setup	FS-K4 requires that the main and reference traces must contain the same frequency axis settings. **To make reference measurements with the new setup** 1. Make a Sweep measurement with the reference signal only. 2. Choose the Trace To Reference command from the Sweep menu to copy the new reference trace into the reference buffer.
Save changes to (file type) (filename)?	You quit FS-K4 or closed a file without saving changes you made to a file. **To save the changes** ➢ Choose the Yes button. **To discard the changes** ➢ Choose the No button. **To continue without quitting FS-K4 or saving the changes** ➢ Choose the Cancel button.
Save option menu changes?	You quit FS-K4 without saving changes you made in the options menu. Option menu settings are stored in the FS-K4.INI file, which can be found in the main Windows directory. **To save the changes** ➢ Choose the Yes button. **To discard the changes** ➢ Choose the No button.
Sorry, no help available for this subject	➢ See, "Obtaining Technical Support" in the Help menu.

Index

A

About FS-K4 command 50
Alpha 62
Analyzer command 48
Analyzer Setup
  create 23
Analyzer setup files 68

C

Caps lock indicator 54
Clear Reference command 44
Close command 52
Command
  About FS-K4 50
  Analyzer 48
  Clear Reference 44
  Close 52
  Contents 50
  Corrected 41
  Default Paths 48
  Delta 45
  Display 47
  Exit 34
  Graph 41
  Limit Line 39
  Log 41
  Maximize 51
  Measure at Marker 45
  Measurement Log 47
  Minimize 51
  Mode 43
  Move 51
  New 31
  Next Marker 45
  Normal 45
  Obtain Technical Support 50
  Open 31
  Original Diagram 46
  Preview Setup 33
  Print 34
  Print Preview 33
  Print Setup 34
  Reference 41
  Residual FM 42
  Residual PM 42
  Restore 51
  Save 32
  Save As 32
  Save Options 49
  Search for Help on 50
  Size 51
  Start 43
  Stop 43
  Sweep Setup 35
  Switch to 52
  Trace to Reference 44
  Uncorrected 41
  Zoom In 45
  Zoom Out 46
Command line options 63
Command reference 31
Communication Problems 65
Computer Option (FSE-B15) 9
Contents command 50
Control menu 51
Corrected command 41
CTRL + ... 60
CTRL + SHIFT + ... 61
Ctrl+C 62
Ctrl+V 62
Ctrl+X 62
Ctrl+Z 62

D

Data files
  result 70
Data list 62
Data storage format 67
Decision messages 77
Default Paths command 48
Deinstallation 12
Del 62
Deleting text 59
Delta command 45
Delta marker 57
Directory 32
Display command 47
Drive 32

E

Edit menu 35
End 62
END 60
Enter 62
Error messages 77
  communication problems 65
Esc 62
Exit command 34
Exit the FS-K3 22

F

F1 to F12 59
FFT Filter 38
File
  load 25
  named 26
  save 26
  types 26
  unnamed 26
File menu 31
Files
  analyzer setup 68
  limit line 67
  log text 72
  result data 70
Format
  data storage 67
FSE-B15 (Computer Option) 9
FS-K4 control menu 53
FS-K4.INI 74
Function keys 59

G

GPIB
  interface card 9
Graph 55
Graph command 41

H

Hardware setup 9
Help Menu 50
Home 62
HOME 60

I

INI file 74
Inserting text 59
Insertion point
  move 60
Installation 9
  on FSEx, FSIQ, ESI 9
  on FSP 13
Interface card
  GPIB 9

K

Keyboard and Mouse 59
Keys 59

L

Limit line
  create 23
Limit Line command 39
Limit Line Files 67
Log 56
Log command 41
Log text files 72

M

Marker 56
  move 60
  re-measure 61
Marker menu 45
Maximize button 53
Maximize command 51
Measure at Marker command 45
Measurement
  perform 27
  sweep 27
Measurement Log command 47
Memory Files 25
Menu
  Control 51
  Help 50
Menu
  Edit 35
  File 31
  FS-K4 control 53
  Marker 45
  Options 47
  Sweep 43
  View 41
Menu bar 53
Menu Commands 31
Message field 54
Messages 77
  communication problems 65
Minimize button 53
Minimize command 51
Mode command 43
Move command 51

N

Network card driver (without LAN interface option) 13
Network card drivers (with the LAN interface option) 20
New command 31
Next Marker command 45
Normal command 45
Normal marker 57
Num lock indicator 54

O

Open command 31
Options Menu 47
Original Diagram command 46

P

Page Down 62
Page Up 62
Parts of the FS-K4 screen 53
Phase Noise Marker 57
Preview Setup command 33
Print command 34
Print Preview command 33
Print Setup command 34
Printer
  setup 29

R

RBW/VBW Ratio 39
Reference
  menu commands 31
Reference command 41
Reference Trace 44
Repeat (sweep) 43
Report
  generate 29
  preview 29
  print 30
Residual FM command 42
Residual Frequency Modulation 42
Residual Phase Modulation 42
Residual PM command 42
Resolution BW 37
Restore button 54
Restore command 51
Result data files 70
RSIB interface libraries 13

S

Save As command 32
Save command 32
Save Options command 49
Screen 53
Search for Help on command 50
Settings box 61
Setup
  analyzer 23
  files 23
  hardware 9
  software 10
  sweep 24
Setup files
  analyzer 68
SHIFT + ... 61
Shift+Tab 62
Size command 51
Smoothing 36
Software remove 12
Software setup 10
Start command 43
Starting FS-K3 22
Status bar 54
Stop command 43
Sweep
  measure 27
  mode 43
  results 28
Sweep menu 43
Sweep Setup

create 24
Sweep Setup command 35
Switch to command 52

T

Tab 62
Table entry box
keys 62
Table entry box 61
TCP/IP network protocol 13
Template 31
Text
insert and delete 59
Text entry field 61
Text files
log 72
Title bar 54
Trace indicator 54
Trace to Reference command 44

U

Uncorrected command 41

V

View menu 41

W

Windows
3.1/3.11 10
95/98/NT 4 11
Workspace 55

Z

Zoom In command 45
Zoom Out command 46